P
Med
N

LIBRARY
APR 29 1946
UNIVERSITY OF TORONTO

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS

ELEVENTH ANNUAL MEETING
SEATTLE, WASH.

THE NATIONAL ASSOCIATION

FOR THE

STUDY AND PREVENTION

OF TUBERCULOSIS

Med
N
National Tuberculosis
Association

THE NATIONAL ASSOCIATION

FOR THE

STUDY AND PREVENTION OF TUBERCULOSIS

TRANSACTIONS OF THE ELEVENTH ANNUAL MEETING

SEATTLE, WASH., JUNE 14–16, 1915

BALTIMORE
WILLIAMS & WILKINS COMPANY
1915

The National Association for the Study and Prevention of Tuberculosis

1914–1915

PRESIDENT

DR. GEORGE M. KOBER

HONORARY VICE-PRESIDENTS

THEODORE ROOSEVELT — SIR WILLIAM OSLER

VICE-PRESIDENTS

LEE K. FRANKEL — DR. W. JARVIS BARLOW

TREASURER

WILLIAM H. BALDWIN

SECRETARY

DR. HENRY BARTON JACOBS

11 Mt. Vernon Place, West, Baltimore, Md.

DIRECTORS

FREDERIC ALMY, Buffalo
JOSEPH S. AMES, Baltimore
WILLIAM H. BALDWIN, Washington
DR. W. JARVIS BARLOW, Los Angeles
MISS KATE BARNARD, Oklahoma City
ERNEST P. BICKNELL, Washington
DR. HERMANN M. BIGGS, New York
W. K. BIXBY, St. Louis
DR. RUPERT BLUE, Washington
MISS MABEL T. BOARDMAN, Washington
DR. VINCENT Y. BOWDITCH, Boston
DR. LAWRASON BROWN, Saranac Lake
SEVERANCE BURRAGE, Indianapolis
DR. T. D. COLEMAN, Augusta, Ga.
MRS. O. B. COLQUITT, Dallas, Texas
DR. HOYT E. DEARHOLT, Milwaukee
DR. GEORGE DOCK, St. Louis
DR. GEORGE H. EVANS, San Francisco
DR. LIVINGSTON FARRAND, Boulder, Colo.
DR. HENRY B. FAVILL, Chicago
DR. LAWRENCE F. FLICK, Philadelphia
HOMER FOLKS, New York
LEE K. FRANKEL, New York
DR. JOHN S. FULTON, Baltimore
DR. ETHAN A. GRAY, Chicago
DR. CHARLES LYMAN GREENE, St. Paul
DR. ELMER E. HEG, Seattle
FREDERICK L. HOFFMAN, Newark, N. J.
DR. G. WALTER HOLDEN, Denver
DR. HENRY BARTON JACOBS, Baltimore
DR. HERBERT M. KING, Loomis, N. Y.
JOHN A. KINGSBURY, New York
DR. S. A. KNOPF, New York
DR. H. R. M. LANDIS, Philadelphia
MISS JULIA C. LATHROP, Washington
COL. J. L. LUDLOW, Winston-Salem
DR. CABOT LULL, Birmingham, Ala.
DR. DAVID R. LYMAN, Wallingford, Conn.
S. LIVINGSTON MATHER, Cleveland
DR. ALFRED MEYER, New York
DR. JAMES A. MILLER, New York
A. L. MILLS, Portland, Ore.
DR. CHARLES L. MINOR, Asheville
JOHN MITCHELL, New York
CHARLES P. NEILL, New York
DR. CHARLES O. PROBST, Columbus, O.
DR. WATSON S. RANKIN, Raleigh, N. C.
DR. M. P. RAVENEL, Madison, Wis.
JULIUS ROSENWALD, Chicago
DR. THEODORE B. SACHS, Chicago
DR. E. C. SCHROEDER, Washington
GEN. C. F. STOKES, Washington
SEYMOUR H. STONE, Boston
DR. EDWARD L. TRUDEAU, Saranac Lake
DR. THOMAS D. TUTTLE, Warm Springs, Mont.
DR. GERALD B. WEBB, Colorado Springs
DR. WILLIAM H. WELCH, Baltimore
DR. F. F. WESBROOK, Vancouver
DR. WILLIAM CHARLES WHITE, Pittsburgh
ALEXANDER M. WILSON, Philadelphia

EXECUTIVE OFFICE

105 East Twenty-second Street, New York

CHARLES J. HATFIELD, M.D., Executive Secretary

ASSISTANT SECRETARY

PHILIP P. JACOBS, PH.D.

FIELD SECRETARIES

DIXON VAN BLARCOM

CHARLES M. DEFOREST

The National Association for the Study and Prevention of Tuberculosis

1915–1916

PRESIDENT

DR. THEODORE B. SACHS

HONORARY VICE-PRESIDENTS

THEODORE ROOSEVELT — SIR WILLIAM OSLER

VICE-PRESIDENTS

DR. E. R. BALDWIN — DR. CHRISTEN QUEVLI

TREASURER

WILLIAM H. BALDWIN

SECRETARY

DR. HENRY BARTON JACOBS

11 Mt. Vernon Place, West, Baltimore, Md.

DIRECTORS

FREDERIC ALMY, Buffalo
JOSEPH S. AMES, Baltimore
DR. EDWARD R. BALDWIN, Saranac Lake
WILLIAM H. BALDWIN, Washington
DR. W. JARVIS BARLOW, Los Angeles
MISS KATE BARNARD, Oklahoma City
ERNEST P. BICKNELL, Washington
DR. HERMANN M. BIGGS, New York
DR. RUPERT BLUE, Washington
MISS MABEL T. BOARDMAN, Washington
DR. VINCENT Y. BOWDITCH, Boston
DR. LAWRASON BROWN, Saranac Lake
SEVERANCE BURRAGE, Indianapolis
DR. HOYT E. DEARHOLT, Milwaukee
DR. GEORGE H. EVANS, San Francisco
DR. LIVINGSTON FARRAND, Boulder, Colo.
DR. LAWRENCE F. FLICK, Philadelphia
HOMER FOLKS, New York
LEE K. FRANKEL, New York
DR. JOHN S. FULTON, Baltimore
JOHN M. GLENN, New York
DR. CHARLES LYMAN GREENE, St. Paul
DR. ELMER E. HEG, Seattle
FREDERICK L. HOFFMAN, Newark, N. J.
DR. HENRY BARTON JACOBS, Baltimore
DR. HERBERT M. KING, Loomis, N. Y.
JOHN A. KINGSBURY, New York
SHERMAN C. KINGSLEY, Chicago
DR. S. A. KNOPF, New York
DR. H. R. M. LANDIS, Philadelphia
MISS JULIA C. LATHROP, Washington
COL. J. L. LUDLOW, Winston-Salem
DR. CABOT LULL, Birmingham, Ala.
DR. DAVID R. LYMAN, Wallingford, Conn.
DR. O. W. MCMICHAEL, Chicago
S. LIVINGSTON MATHER, Cleveland
DR. JAMES A. MILLER, New York
A. L. MILLS, Portland, Ore.
DR. CHARLES L. MINOR, Asheville
JOHN MITCHELL, New York
CHARLES P. NEILL, Washington
DR. GEORGE T. PALMER, Springfield, Ill.
DR. LEROY S. PETERS, Albuquerque
DR. CHARLES O. PROBST, Columbus, O.
DR. CHRISTEN QUEVLI, Tacoma
DR. WATSON S. RANKIN, Raleigh, N. C.
DR. M. P. RAVENEL, Columbia, Mo.
DR. THEODORE B. SACHS, Chicago
DR. E. C. SHROEDER, Washington
GEN. C. F. STOKES, Washington
SEYMOUR H. STONE, Boston
DR. EDWARD L. TRUDEAU, Saranac Lake
DR. THOMAS D. TUTTLE, Seattle
DR. E. R. VAN DER SLICE, Kearney, Neb.
MISS MAUDE VAN SYCKLE, Detroit
DR. GERALD B. WEBB, Colorado Springs
DR. WILLIAM H. WELCH, Baltimore
DR. WILLIAM CHARLES WHITE, Pittsburgh

EXECUTIVE OFFICE

105 East Twenty-second Street, New York

CHARLES J. HATFIELD, M.D., EXECUTIVE SECRETARY

ASSISTANT SECRETARY

PHILIP P. JACOBS, PH.D.

FIELD SECRETARIES

CHARLES M. DEFOREST

FREDERICK D. HOPKINS

LOCAL COMMITTEE OF ARRANGEMENTS

Dr. Chrisien Quevli, Tacoma, Chairman

H. C. Henry, Seattle
Dr. J. S. McBride, Seattle
J. V. A. Smith, Seattle
Dr. Thomas D. Tuttle, Seattle
Mrs. R. E. Buchanan, Spokane
Mrs. Tabitha Jones, Walla Walla
Mrs. J. S. McKee, Hoquiam
Henry Falk, Boise
Mrs. Sadie Orr-Dunbar, Portland
Mrs. Frances Harrison, Vancouver

Miss Bethesda I. Beals, Seattle, Secretary

TABLE OF CONTENTS

PAGE

Report of the Meeting 11
Report of the Treasurer 14
Address of the President, Tuberculosis with Special Reference to its Prevention, by George M. Kober, M.D 17
Report of the Executive Office 27
The Child and the Home, by George M. Kober, M.D 41
The Child and the School, by Sherman C. Kingsley 48
The Child and the Community, by Edward O. Otis, M.D 56
Trachea Position, by Gerald B. Webb, M.D., Alexius M. Forster, M.D., and G. Burton Gilbert, M.D 69
The Cutaneous Tuberculin Vaccination Method, by John Ritter, M.D 72
A Study of Kroenig's Isthmus in Pulmonary Tuberculosis, by Walter C. Klotz, M.D.. 88
The Diagnosis of Intra-Thoracic Tuberculosis in Children, by W. J. Dobbie, M.D... 93
A Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, by John B. Manning, M.D., and Howard James Knott, M.D. 101
Does the General Practitioner Utilize the Means at his Disposal for the Diagnosis of Early Pulmonary Tuberculosis? by James S. Ford, M.D 108
The *x*-Ray as an Aid in the Study of Pulmonary Tuberculosis, by Ray W. Matson, M.D.. 116
Prevention and Care of Laryngeal Tuberculosis, by Julius Dworetzky, M.D 119
Pancreatic Ferment Determination in Pulmonary Tuberculosis, by Ethan A. Gray, M.D., and Olga Pickman, M.D 126
Essential Points in the Early Determination of Tubercle, by Frederick Slyfield, M.D.. 132
Non-Tuberculous Lesions of the Lung, by William Charles White, M.D 140
The Treatment of Pulmonary Hemorrhage by Venesection, by A. G. Shortle, M.D... 147
Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, by Theodore B. Sachs, M.D 150
Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, by C. H. Vrooman, M.D 159
A Clinical Report on Sixty-nine Cases Treated by Artificial Pneumothorax, by Henry Schwatt, M.D 164
Clinical Observations on Artificial Pneumothorax with Report of 73 Cases. by Ralph C. Matson, M.D 175
The Influence of Lung Disease through Artificial Diaphragm Paralysis ("Phrenikotomie"), by Ralph C. Matson, M.D., and Marr Bisaillon, M.D 183
Exudates in Artificial Pneumothorax, by LeRoy S. Peters, M.D 186
A Case of Spontaneous Pyopneumothorax Complicated by Hydro- or Pyopneumopericardium, by Alfred Meyer, M.D 193
Sanatorium Temperature Records, by David R. Lyman, M.D 205
The Serum Diagnosis of Tuberculosis in Relation to Immunization and Prophylaxis, by Enrico Castelli, M.D 211
Immunity in Tuberculosis, by G. Burton Gilbert, M.D. and Gerald B. Webb, M.D.. 227
The Function of the Spleen in the Experimental Infection of Albino Mice with Bacillus Tuberculosis, by Paul A. Lewis, M.D. and Arthur Georges Margot 228
Further Observations on the Presence of Iodine in Tuberculosis Tissues, by Paul A. Lewis, M.D., and Robert B. Krauss 231
The Bacteraemic Nature of Tuberculosis and Leprosy, by D. Rivas, M.D 233

PAGE
The Value of Copper in the Treatment of Tuberculosis, by Lydia M. DeWitt, M.D... 237
On New Methods of Serum Diagnosis of Tuberculosis, by J. Bronfenbrenner and M. J. Schlesinger... 242
A Study of the Cultivation of the Tubercle Bacillus Directly from the Sputum, by Robert A. Keilty, M.D... 248
The Widal Reaction in Tuberculous Persons, by A. J. Chesley, M.D., and E. M. Wade.. 250
Some Observations on Streptothrix Infections and their Relation to Tuberculosis, by David John Davis, M.D... 255
Communicability of the Avian Tubercle Bacterium to Mammals, by L. R. Himmbl-berger, M.D... 262
Tuberculosis of the Ovary, by C. E. Royce, M.D... 263
The Official Responsibility of the State in the Tuberculosis Problem, by William Charles White, M.D... 269
The Official Responsibility of the City in the Tuberculosis Problem, by Theodore B. Sachs, M.D... 278
The Official Responsibility of the County in the Tuberculosis Problem, by George J. Nelbach... 288
The Duties and Opportunities of the State Tuberculosis Association, by Miss E. L. M. Tate... 302
The Duties and Opportunities of the Local Tuberculosis Association, by James Minnick. 312
The Relation State and Local Anti-Tuberculosis Associations should Sustain to Each Other, by Charles J. Hatfield, M.D... 321
House Infection: A Potent Source of Tuberculosis, by Isaac W. Brewer, M.D... 328
Relative Prevalence of Tuberculosis under Good and Bad Housing Conditions, by Charles J. Hastings, M.D... 335
Housing and Tuberculosis—A Legislative Program, by Lawrence Veiller... 343
Constitution and By-laws... 353
Geographical List of Members... 359

Index... 405

ELEVENTH ANNUAL MEETING

OF

The National Association for the Study and Prevention of Tuberculosis

THE eleventh annual meeting of The National Association for the Study and Prevention of Tuberculosis was held at Plymouth Congregational Church, Seattle, Washington, on Monday, Tuesday and Wednesday, June 14, 15 and 16, 1915.

The president of the Association, Dr. George M. Kober, called the meeting to order at nine o'clock on the morning of June 15. The address of the President was presented and filed for publication in the *Transactions*. The report of the Executive Office for the year ending April 30, 1915 was read and approved.

On motion from the floor, the following committee was appointed by the Chair to present names to fill vacancies in the Board of Directors:

COMMITTEE ON NOMINATIONS

Dr. Gerald B. Webb, Colorado, *Chairman*
Dr. W. Jarvis Barlow, California
Dr. George T. Palmer, Illinois
Dr. Wilfred Manwaring, California
George J. Nelbach, New York

The following Committee on Resolutions was also appointed by the Chair:

COMMITTEE ON RESOLUTIONS

Dr. Edward O. Otis, Massachusetts, Chairman
Dr. Christen Quevli, Washington
Dr. Alfred Meyer, New York
Dr. Theodore B. Sachs, Illinois
Dr. Thomas D. Tuttle, Washington

At the business meeting of the Association, held on June 16, the following were elected directors of the Association for terms of five years:

Dr. Edward R. Baldwin, New York
William H. Baldwin, District of Columbia
Dr. Hoyt E. Dearholt, Wisconsin.
John M. Glenn, New York
Sherman C. Kingsley, Illinois
Dr. O. W. McMichael, Illinois
Dr. George T. Palmer, Illinois.
Dr. LeRoy S. Peters, New Mexico
Dr. Christen Quevli, Washington
Seymour H. Stone, Massachusetts
Dr. E. R. Van der Slice, Nebraska
Miss Maude Van Syckle, Michigan

Dr. Edward O. Otis, Chairman of the Committee on Resolutions, presented the following resolutions with the endorsement of the Committee. They were unanimously adopted by the general meeting:

1. *Resolved*, That The National Association for the Study and Prevention of Tuberculosis expresses its gratitude and appreciation of the courtesies extended to it by the Washington Association for the Prevention and Relief of Tuberculosis, the Seattle Red Cross Seal Committee, the Chamber of Commerce, the local Committee of Arrangements, the Tacoma and Pierce County Anti-Tuberculosis Association, the city and State officials, and to Mrs. Buchanan, Dr. and Mrs. Quevli, Mr. H. C. Henry, Mrs. W. E. Humphrey, and to all the good citizens of Seattle who have contributed so largely to the success of the meeting and entertainment and comfort of the attending members.

2. WHEREAS; State, city and county tuberculosis hospitals and sanatoria are an important factor in the gradual attainment of control of tuberculosis in this country, and

WHEREAS: The efficiency of these institutions can be attained only through administration free from politics and by a personnel selected solely upon the consideration of their fitness,

It is resolved by The National Association for the Study and Prevention of Tuberculosis that the Boards of Management of such institutions should always be chosen on the basis of their knowledge and experience in the different phases of the problem, and it is further

Resolved, That it is essential that all the administrative and medical officers of such institutions be selected by means of strict competitive civil service examinations.

3. *Resolved*, That The National Association for the Study and Prevention of Tuberculosis urge upon all local anti-tuberculosis associations the importance of co-operating with various official and voluntary associations having for their object the prevention of disease, and especially those associations dealing with the problems of housing; and

Resolved, That the National Association recommends that in communities where there are no housing associations the local tuberculosis association appoint an active committee to be known as the housing committee.

4. *Resolved*, That The National Association for the Study and Prevention of Tuberculosis approves of the plan for municipal regulation and supervision of the milk supply, such regulation and supervision supplementing state and federal control; and that such regulation include (1) pasteurization of all milk for human consumption, if not of the grade of certified milk; (2) tuberculin tests for all dairy herds, supplying milk for municipal consumption; and, (3) the frequent inspection of dairy herds.

At a meeting of the Board of Directors held on Wednesday, June 16, the following officers were elected for the ensuing year:

Dr. Theodore B. Sachs, Illinois, *President.*
Dr. Edward R. Baldwin, New York, *First Vice President.*
Dr. Christen Quevli, Washington, *Second Vice President.*

The following Directors were elected to serve on the Executive Committee for the ensuing year:

William H. Baldwin, District of Columbia
Homer Folks, New York
John M. Glenn, New York
Dr. David R. Lyman, Connecticut
Dr. O. W. McMichael, Illinois
Seymour H. Stone, Massachusetts
Dr. William Charles White, Pennsylvania

A resolution was adopted to the effect that it was the concensus of opinion that the next annual meeting shall be held in Cincinnati, but that the final decision shall be left to a later meeting of the Executive Committee or the Board of Directors.

REPORT OF THE TREASURER

NEW YORK, May 17, 1915.

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS, 105 East 22d Street, New York.

Dear Sirs: In accordance with the request of Dr. Charles J. Hatfield, Executive Secretary, we have made an audit of the cash account of the Treasurer of your Association for the year ended April 30, 1915.

The following is a correct summary of the cash transactions for the year as recorded in the Cash Book:

Balance, May 1, 1914	$1,816.09
Receipts	36,226.92
Total	$38,043.01
Disbursements	34,999.85
Balance, April 30, 1915	$ 3,043.16

Certification of the cash on deposit April 30, 1915, was obtained from the American Security & Trust Company, of Washington, D. C.

The cash in the hands of the Assistant Secretary, which is not a part of the cash book balance, was counted on May 12 1915; and taking into consideration disbursements amounting to $477.02, for which reimbursing check had not been received from the Treasurer, the fund of $777.36 was proven.

Yours truly,

HASKINS & SELLS,
Certified Public Accountants.

RECEIPTS

Balance on hand May 1, 1914		$1,816.09
Dues of members	$9,790.00	
Donations	520.98	
Appropriation from Russell Sage Foundation	8,750.00	
Red Cross Seals, 1913 account	8,574.66	
Red Cross Seals, 1914 account	5,000.00	
Refund of expenses of Red Cross Seal campaign	523.57	
Appropriations for Field Secretary	1,025.00	
Sale of "Fresh Air and How to Use It"	146.00	
Sale of "Directions for Living and Sleeping, etc."	35.41	
Sale of Transactions of Annual Meetings	47.49	
Sale of directories	58.92	
Sale of "Tuberculosis Hosp. and Sana. Construction"	84.00	
Sale of International Congress Transactions	27.00	
Sale of property pamphlet	94.00	
Sale of legislation pamphlet	12.30	
Sale of miscellaneous reprints and pamphlets	69.60	
Sale of tuberculosis day literature	185.36	
Sale of lantern slides	122.25	
Sale of cuts	252.56	
Sale of buttons	147.95	
Sale of office equipment	29.00	
Interest on bank balance	47.76	
Refund of traveling and field work expenses	137.00	
Rental received from sub-lease	360.00	
Telephone service	41.02	
Miscellaneous refunds	137.09	
Dues of corresponding members International Association	8.00	
		$36,226.92
		$38,043.01

DISBURSEMENTS

Rent	$1,875.96	
Storage	240.00	
Salaries	10,387.35	
Clerical assistance	3,331.92	
Printing, general	551.53	
Printing transactions of Ninth Annual Meeting	1,827.66	
Printing, transactions of Tenth Annual Meeting	1,572.20	
Printing "Directions for Living and Sleeping, etc."	832.40	
Printing, Directory supplement	196.38	
Printing, property pamphlet	207.07	
Printing, legislation pamphlet	195.45	
Printing and distributing "Fresh Air, etc."	688.02	
Printing "Tuberculosis Hosp. and Sana. Construction"	1,203.80	
Journal of the Outdoor Life Subscriptions	1,616.45	
Miscellaneous reprints and pamphlets	433.22	
Stationery	531.16	
Tuberculosis Day campaign	257.23	
Field work and traveling expenses	2,908.01	
Expenses of sectional conferences	426.08	
Postage and express	2,100.38	
Telephone service and telegrams	382.41	
Incidental expenses	276.12	
Office supplies	398.35	
Furniture and office equipment	181.10	
Multigraph equipment and supplies	562.29	
Distribution of Transactions, Tenth Annual Meeting	183.12	
Reporting Tenth Annual Meeting	176.10	
Expenses Tenth Annual Meeting	83.75	
Cost of handling international transactions	38.08	
Auditing of accounts	25.00	
Clipping service	127.74	
Advertising	23.00	
Motion picture scenario	100.00	
Red Cross Seal campaign expenses	514.94	
Interest	51.43	
Lantern slides	135.32	
Cuts	232.50	
Buttons	126.33	
		$34,999.85
Balance on hand, April 30, 1915		$3,043.16

WM. H. BALDWIN, *Treasurer.*

Contributors to the funds of the Association for year May, 1914, to April, 1915, were:

Dr. Henry G. Barbey
Charles W. Harkness
Samuel Mather
E. S. C.
Miss Edith D. Borg
Mrs. Amy C. Hazard
Miss Amelia H. Jones
John W. Auchinloss
L. W. Beecher
J. V. V. Booraem
Anonymous
H. C. Berlin
Miss Eliza Billings
Miss L. P. Bliss
W. W. Byington
Dr. Simon F. Cox
Mrs. John French
Dr. F. W. Johnson
Prof. Nelson G. McCrae
Mrs. Robert McCurdy
Willard Pope
Dr. Josephine Schneider
Francis Lynde Stetson
Dr. E. L. Trudeau
J. F. Winchester
West Lebanon M. E. Church
Miss Mary H. Walcott
Miss Helen L. Jones
O. Olafson
Mrs. Wm. B. Rankin
Anonymous
J. Franklin Carter
Dr. Charles H. Cocke
Joseph P. Thompson

ADDRESS OF THE PRESIDENT

TUBERCULOSIS WITH SPECIAL REFERENCE TO ITS PREVENTION

By George M. Kober, M.D.

Washington

Once more we are assembled in a council of war to gather knowledge, strength, and enthusiasm for the crusade against the great white plague. The ravages of the invisible foe known as the "Bacillus tuberculosis" are shown by the fact that in spite of a marked and gratifying progress, tuberculosis in all forms carried off during 1913 over 143,000 victims in the United States alone, representing an economic loss of over $214,000,000 per annum.

A HOPEFUL PROBLEM

Great and grave as the problem may appear, there is certainly hope when we recall the fact that the death rate from tuberculosis has been reduced from 326 per 100,000 in 1880 to 147.6 in 1913, which means that if the fomer rate of mortality had been continued the number of deaths from this disease in 1913 would have been 322,027 instead of 143,000; this is equivalent to a saving of 179,027 lives during one year from this disease alone.

While much has been accomplished, more remains to be done before we can hope for the eradication of this preventable disease.

THE SPREAD OF TUBERCULOSIS

Time will not permit me to enter into all the details of pulmonary tuberculosis. I desire however to emphasize a number of points, with special reference to the spread and prevention of this disease.

The disease is communicable from man to man, and from animal to man and from man to beast. The transmission always takes place through the agency of the specific germs, which eminate from a previously diseased organism, and one of the most frequent modes of infection is doubtless by inhalation of bacilli laden dust or air. It is perfectly conceivable that the expectoration of consumptives on floors, clothing, etc , soon becomes dry and pulverized and as a constituent of atmospheric dust may be inhaled. It has also been demonstrated by Flügge that a consumptive with an active expectoration, in coughing, talking, or sneezing, projects into the air little droplets of mucous laden with tubercle bacilli, which can be inhaled within three feet from the patient. These droplet infections constitute the most dangerous form of transmission, and account for the so-called family infections, which are so frequently observed, especially in small homes.

The reason why droplet infection is especially virulent is because the bacilli enter the respiratory passages in a fresh state without prolonged exposure to light and desiccation, which would tend to diminish the virulency or to destroy the vitality of the germs. Both of these modes of spreading the disease can be prevented by the collection and proper disposal of the sputum, by avoidance of close contact, and by insisting upon a consumptive guarding his mouth and nose, by means of a handkerchief, while talking, coughing, or sneezing.

INFECTION THROUGH THE DIGESTIVE TRACT

In our present state of knowledge the next most frequent portal of entry of germs is through the digestive tract. Here again let us refer to the sputum carelessly expectorated by consumptives on floors or carpets or brought in on the shoes or long trained skirts. What is to prevent a child creeping on the floor soiling its hands and carrying the infectious material to its mouth. Absolutely nothing so long as we tolerate careless and unteachable consumptives to expectorate promiscuously In this connection we should also emphasize the danger from kissing and the common use of eating and drinking utensils, in which instances the infection is transmitted by small but virulent particles of sputum adhering to the lips of consumptives. The danger from these sources has been recognized, and ordinances have been enacted forbidding spitting in public places and the common use of drinking cups. But should we not also insist upon provisions for cuspidors and individual drinking cups or fountains. How many of the public buildings, schools, and railway coaches are thus supplied?

DANGER FROM BOVINE TUBERCULOSIS

In addition to the human sources, the danger from transmission of bovine tuberculosis through the agency of infected milk and meat cannot be ignored. The danger from cooked meat is quite imaginary since exposure to a temperature of even 140°F. for 20 minutes suffices to kill the germs. The degree of danger from raw tuberculous meat remains to be determined, although we have records of cases where butchers and veterinarians have been inoculated with tuberculosis through wounds and abrasions of the skin from infected meat.

The danger from tuberculous milk, however, is real and should be emphasized. It has been shown that between 6 and 7 per cent. of the samples of average market milk contain tubercle bacilli. The danger from this source is therefore especially great during the milk drinking age, as is also shown by the undue prevalence of tuberculous meningitis and of tuberculosis of the lymphatic glands, joints, and bones during infancy and childhood. There may also be a certain amount of danger from infected dairy products such as cheese and butter.

Recent post mortem examinations, conducted by Hamburger and Monti in the Vienna hospitals, show that 95 per cent. of the children who came to autopsy, largely children of the poorer classes, are already tuberculous by the time they reach the twelfth or thirteenth year of life. Just how much of this almost universal infection is due to bovine origin and how much to human

sources of danger remains to be determined. Von Behring holds that in the great majority of cases of pulmonary tuberculosis the primary infection dates back to infancy and childhood, and is derived from the milk of tuberculous cows.

While it is true that there is a special danger from infection in children, which may remain dormant until the period of adolescence and maturity is reached, I am not prepared to accept the view that infectious cow's milk is the primary and most important source of infection, in spite of the fact that I was one of the first to emphasize the danger of infected cow's milk. My reason for not accepting Von Behring's dictum is that the bovine type of tubercle bacillus is rarely found in pulmonary consumption, and was not found in a single case in the 277 autopsies of pulmonary tuberculosis in children reported by Dr. William H. Park. It is claimed that there is a possibility of the transformation of the bovine into the human type of the bacillus by prolonged survival in the human body. That may be true, but remains to be proven. In the meantime we know that the human type was found in 388 autopsies and the bovine type in only 24 or 5.82 per cent. of 412 autopsies—a percentage which closely approximates the frequency of tubercle bacilli found in cow's milk. I do not wish to underrate the danger from this source. By all means let us continue our efforts towards the ultimate extermination of bovine tuberculosis and until this is accomplished it is clearly our duty to pasteurize, or at least scald our milk.

AGENCY OF FLIES IN THE TRANSMISSION OF TUBERCULOSIS

The possibility that the germs of tuberculosis may be carried by means of flies and dust, suggests that greater precautions be exercised in the exposure of food stuffs, in the homes, and in show windows and markets, and also that an effective anti-fly campaign should be carried on. (Other modes of infection such as by the mucous membranes of the eye, genitals, wounds, and even through the unbroken skin have been reported.)

HEREDITARY TRANSMISSION

There is little or no evidence to show that the disease is ever inherited. We may assume, however, that in children of consumptive parents, we are dealing with the transmission of vulnerable anatomical elements, and this, together with the fact that they are freely exposed in such families to the germs, renders them peculiarly liable to the disease.

TUBERCULOSIS ALMOST A UNIVERSAL INFECTION IN CERTAIN CLASSES

From what has been said it is evident that the tubercle bacilli are widely scattered and the modes of invasion are also numerous. It is not surprising therefore that practically every one has received into the body tubercle bacilli, which have left their record behind, either as latent, healed, or active tuberculosis. But the large number of the cases in whom the disease does not de-

velop, clearly indicates that in addition to the germs, there must also be a suitable soil for their growth and destructive effects. Such a soil is usually found in persons of feeble physique, victims of malnutrition, whose bodies have been weakened by one or more of the numerous predisposing causes.

THE ALCOHOL HABIT AND VICE DISEASES AS A PREDISPOSING CAUSE

Lanceraux has shown that in 2192 cases of tuberculosis studied by him, over one-half were confirmed drunkards, and Guttstadt's statistics also indicate that consumption is especially common among persons engaged in the liquor traffic. Indeed every physician knows that alcohol not only predisposes to tuberculosis, pneumonia, typhoid fever, and other infectious diseases, but also that these diseases are more fatal, or run a more serious course, in alcoholic subjects. The same is true of the so called "vice diseases," probably because of a general depraved nutrition of the system, with consequent diminished power of resistance.

Clinical experience indicates that faulty nutrition, debility, loss of blood, anemia, mental anxiety, diabetes, whooping cough, measles, and other diseases, favor the development of tuberculosis. We also know that a predisposition may be inherited, as evidenced by a delicate physique, narrow chest, and general vulnerability of the tissues. A predisposition to tuberculosis may also be acquired by dust producing occupations, and here the amount of dust is perhaps less important than the character of the particles which compose it.

The Influence of Dust.—The influence of the dust on the prevalence of the disease is strikingly shown by the fact that the tuberculosis rate among 472,000 males in the United States, exposed in 15 occupations to the inhalation of dust was 2.29 per 1000, against a rate of 1.55 for all occupied males. Statistics collected by Sommerfeld show that with an average tuberculosis death rate of 4.93 per 1000 in the population of Berlin, the rate in non-dusty trades was 2.29 and in dusty trades 5.42.

The explanation for this is to be found in the fact, that dust acts as an irritant and causes catarrhal conditions of the mucous membranes, and even more serious chronic inflammation of the respiratory organs. The chronic inflammatory conditions thus produced naturally favor invasion of the tubercle bacillus, or they may light up a latent infection contracted in early life.

It is estimated that our industrial workers, constituting about one-third of the population, contribute about one-half of all the deaths from tuberculosis in this country, and that by factory sanitation and effective methods for the prevention and removal of dust, fully one-half of these lives could have saved. This is not all speculative, since Professor Röpke has shown that the mortality of Solingen in Germany, the population of which is largely made up of employes in the cutlery industry, has been reduced from 20.63 per 1000 in 1885 to 9.3 per 1000 in 1910, and the consumption death rate from 5.4 in 1885 to 1.8 in 1910 per 1000 of population. Similar data are available to show that diseases of the respiratory organs, in some of the German cement works, have been reduced from 9.3 per cent. to 3.3 per cent. after the installation of a suitable apparatus for the removal of dust.

What can be done in some of the most dangerous industries in Germany can be done in this country, and will be done as soon as the importance and feasibility of the subject is fully appreciated.

Influence of Sewers.—The observations of Drs. Bowditch of Boston, and Buchanan of England indicate that damp soils and damp houses are important predisposing causes of tubecurlosis. We also know that with the introduction of sewers the mortality from this disease has been reduced in numerous cities from 30–40 per cent. The only reasonable explanation is that sewers have resulted in an improvement of the air we breathe, and rendered otherwise damp soils and habitations dry and more healthful.

Insanitary Houses.—It has long since been known that tuberculosis is far more prevalent in damp, dark, and insanitary houses. The death rate is often double and treble that of other homes. It should be remembered that the tubercle bacillus clinging to the floor and walls, in carelessly expectorated sputum or droplets, would be destroyed by a few hours of exposure to sunlight, but finds in dark and damp tenements a suitable environment for continued vitality.

We have heard of the notorious "lung blocks" from Dr. Biggs of New York and Dr. Flick of Philadelphia. Among the 80,000 houses in the city of Paris, according to Marie Davy, there were 4443 with an unusually high mortality rate; in 820 of these the mortality from tuberculosis was 9.8 per 1000 as compared with 4.5 per 1000 in the general population. The cause was attributed to overcrowding, deficient ventilation, lack of sunlight, and dampness, all of which tend to lower the general vitality.

The writer has no hesitation in declaring that the housing conditions of the least resourceful people have been and are even now a most important factor to swell the frightful mortality from consumption and other so-called diseases, engendered by an unwholesome environment. In estimating the influence of bad housing conditions we should remember that the frightful prevalence of tuberculosis among our Indians and Negro population coincided with improper housing and that the marked decline in the Army and Navy rates of different countries coincided with increased air space and was not materially influenced by changes in food, clothing, and other hygienic or social factors.

The State may not be in a position to provide sanitary homes, but it can at least regulate and supervise the construction of all new houses, with reference to light, air space, plumbing, exclusion of dampness, etc., and can enact laws for the condemnation of houses unfit for human habitations.

INFLUENCE OF PARKS AND BREATHING SPACES ON THE PREVALENCE OF TUBERCULOSIS

Wernicke in his Monograph on "Diseases and Social Conditions," points out that in London, where the parks and unoccupied area of the city available for breathing spaces amounts to 14 per cent. the tuberculosis death rate is 1.9 per cent.; in Berlin with 10 per cent. of the city area available for breathing spaces it is 2.2 per cent. and in Paris with only 4.3 per cent. of open spaces, the death rate from consumption is 5.1 per cent. These figures indicate the

value of pure air afforded by large open breathing spaces, and also furnish a strong argument in favor of fresh air schools, day camps, and summer outings, which have everywhere yielded most beneficial results.

PHYSICAL CULTURE, PLAYGROUNDS, AND GENERAL HEALTH MOVEMENT

The State should not only provide sanitary schools, but also an abundance of parks, and playgrounds, and should pay special attention to the physical development, not only of school children, but also of young adults of all classes. It is well known that a predisposition to the disease caused by the existence of vulnerable anatomical elements may certainly be overcome, by proper food, pure air, physical culture, and systematic hardening of the skin, secured by bathing, and no community should be without these hygienic advantages. We also know how much military training has done to "stiffen and strengthen the physique of men" as Osler expressed last April, while commenting on the development of the citizen soldiers at Oxford. The mental and physical vigor of our nation depends upon the proper development of the child. Child labor, under insanitary environment, cannot fail to exert a baneful influence and should not be tolerated. If it be found that school children are starving for want of proper food, it is clearly our duty to take an interest in the wage question and make suitable provisions to prevent permanent dependency.

PREVENTIVE MEASURES

I have spoken with some emphasis of the fundamental predisposing causes of pulmonary tuberculosis, for it must be realized that after the disease has once gained a foothold, the question of cure involves great difficulties and financial sacrifices. Hence, as in all other infectious diseases, prevention should be the watchword of the campaign. It can be truly said that a campaign of popular education, which not only emphasizes the cause and spread of the disease, but also the improvement of the general health of the people, thereby increasing the resisting power of the individual to the ubiquitous tubercle bacillus is of the utmost importance. The value of health talks is especially great for school children. When we supply our children with healthful school rooms and teach them the value of pure air, sanitary homes, of proper and sufficient food, of physical culture, baths, and suitable clothing, and the importance of temperate habits and of pure and clean lives, the lessons taught will be applied in the homes and workshops of the nation. Such a plan should be supplemented by traveling car exhibits with competent lecturers and with the fullest co-operation of local health authorities. No opportunity should be lost in the general campaign, to spread the gospel of personal hygiene and general sanitation, for be it remembered that every movement which makes for better health and a strong, temperate, virile, and untainted race, will be an important factor in the prevention of this terrible scourge.

EARLY DIAGNOSIS

One of the important points in the educational campaign is to impress upon the public the fact that the human machine in this age of speed, is subject to unusual wear and tear and needs careful periodical inspections. We hail therefore with pleasure that a Life Extension Institute has been organized, fully equipped to make examinations for the purpose of detecting disease in its incipiency, when proper treatment by the family physician can check or cure it.

This not only applies to tuberculosis but also to chronic degenerative diseases, which are constantly increasing and contribute so largely to the waste of human life. The Institute referred to has already rendered excellent service and it is perhaps only a question of time when the average man or woman will see the importance of keeping in the highest state of efficiency. For those unable to defray the cost, the employers may very properly assume the burden, and it may indeed be found eminently useful for our Tuberculosis Dispensaries to encourage such periodical examinations among the indigent classes, with a view of making an early diagnosis.

PROVISIONS FOR THE CARE AND TREATMENT OF CONSUMPTIVES

Tuberculosis dispensaries should be established in all cities and towns and at convenient places for the rural population. The primary object of these dispensaries is the recognition of the early cases, with a view of prompt treatment. Such dispensaries should preferably be connected with existing medical charities, and especially with medical schools, so that the future family physician may receive proper training in early diagnosis and in tuberculosis problems in general. This at present is a much neglected field in medical education, for, alas, many cases remain unrecognized until it is too late to repair the damage inflicted to the lungs, and the danger from infection to others. When for any reason circumstances compel home treatment, a course which should always be discouraged in the poorer classes, it is essential that a visiting nurse be employed to insure proper food, sanitary oversight of the home, and an early examination of other members, especially the children of the family.

Sanatoria and Hospitals.—There are now in the United States 550 sanatoria, hospitals, and day camps, with approximately 35,000 beds devoted to tuberculous patients. There are over 400 dispensaries with over 1000 physicians in regular attendance, and a corps of about 4000 visiting nurses engaged exclusively in tuberculosis work. There is no doubt that in a majority of the incipient cases the disease is arrested, and those who have the means to care for themselves may enjoy comparatively good health. It must be admitted, however, that 75 per cent. of those discharged as apparently cured, when obliged to return to bad social and industrial conditions, suffer relapses and finally die of the disease. Such a sad termination might be prevented by the establishment of working farms or colonies, improved living conditions, and change of work. Much of this involves great social reforms, which may not

be attained for many years. In the meantime let us see to it, by educational methods at the sanatoria, that the discharged patient is properly informed how to care for himself even under adverse surroundings.

Hospitals for Advanced Cases.—The leaders in the anti-tuberculosis movement have long since realized that the advanced and helpless cases are the most dangerous sources of spreading the disease. They have reached the conclusion that the segregation of these cases in hospitals is of very great preventive value. It is not considered wise to establish special hospitals for advanced cases, as they soon acquire the reputation of being "houses for the dead." It is doubtless better to care for such patients in special pavillions connected with general hospitals or already established sanatoria. In the city of Washington the Tuberculosis Hospital cares for all classes of cases. The question arises how many hospitals and beds for advanced cases are needed. This depends upon the number of deaths and the prevalence of the disease in a given community.

Of the 143,000 deaths in the United States, we may assume that 25 per cent. belong to the well-to-do classes, who can afford separate rooms, special nurses and other safeguards at their homes, leaving an average of 117,250 patients to be cared for in hospitals. The average duration of an advanced case in a hospital is about 110 days, which enables each bed to be used for three patients a year, hence we may conclude that about 35,000 beds for the advanced cases alone are needed, which is our present capacity for all classes of patients. The original cost of construction and equipment need not exceed $1,200 per bed, and the cost of maintenance is about $10 a week. This sum, high as it may appear is trivial in the face of the present economic losses from this disease. Apart from this it is the only humane way to relieve the poor families of the burden of caring for their helpless sick, and one of the most effective methods in the prevention of the spread of the disease. Moreover, with the segregation of the advanced cases, it may be confidently expected that there will be a steady diminution in the number of cases to be cared for and a corresponding decrease in the annual expense.

In view of the great suffering and economic losses involved and the almost utter hopelessness of a cure in the majority of our tuberculosis patients, let us be mindful of the fact that after all "Prevention is greater than Cure."

In this glorious service, which claims the heart and mind alike, success has crowned the past and we may reasonably hope judging from the same progress which has been made since 1880, that tuberculosis, the scourge of the human race, may be practically banished before the close of the present half of the twentieth century.

CONCLUSIONS

The facts presented justify the following conclusions:

1. Tuberculosis is an infectious disease caused by a specific organism and an inherited and acquired predisposition play an important role.

2. The majority of infections occur in infancy and childhood and the disease may remain quiescent until some debilitating factors lighten up these latent infections.

3. The germs may enter the system by the respiratory and alimentary passages and even by the skin and mucous membranes if there be an abrasion.

4. While the bacillus may be transmitted through the milk, flesh, and blood of animals and man, the most common and effective way of dessiminating the disease is by the sputum and droplets of tuberculous patients.

5. The habitation of consumptives, their personal effects, clothing, bedding, etc., are infected and liable to convey the disease to others.

RECOMMENDATIONS FOR IMMEDIATE ACTION

Since the prevalence of tuberculosis is influenced by a large number of predisposing causes it is clearly our duty to continue an effective educational campaign in which the following points should be emphasized:

1. In view of the fact that from 6 to 7 per cent. of the samples of the average market milk contain bovine tubercle bacilli, let us urge, by education and otherwise, that all milk unless derived from tuberculin tested animals, be pasteurized or scalded.

2. Since the mortality from tuberculosis among inmates of insanitary homes is often double and treble that of the general population, it is our duty to see that the building regulations are so modified as to prohibit the renting of houses unfit for human habitation.

3. Because of the fact that nearly one-half of the 143,000 deaths from tuberculosis last year, occurred among the industrial workers who constitute about one-third of the population, we should strongly urge the enactment and enforcement of laws for the removal of dust and fumes, the foes of industrial life.

4. In view of the fact that the physical vigor of a nation depends upon the environment of childhood and youth, it is important that the hygiene of the home, schools, playgrounds, etc., be not neglected, and that we lend a helping hand in public health activities, since every movement for higher standards of health will increase the efficiency of the individual and his power of resistance not only to tuberculosis, but also to other preventable diseases.

STATE AND MUNICIPAL METHODS OF PREVENTION

Special emphasis has been given to the prevention of the predisposing causes of consumption, and it is equally important to point out the state and municipal methods for prevention.

1. Compulsory notification of cases to the health authorities as soon as the disease is recognized. This is of vital importance for the location and control of the sources of infection and for the protection of the family and others. The health authorities, apart from distributing printed directions for the use of the family and the patient as regards the cure, disinfection of sputum, and avoidance of droplet infection, should also resort to disinfection of the home and personal effects, especially upon the death of the patient or vacation of the premises.

2. The enactment and enforcement of laws against expectoration, coughing into the faces of persons, and the common use of drinking cups are called for.

Provisions should be made for individual drinking cups or fountains, and for suitable spittoons and their disinfection in all public buildings. The public should not cultivate an exaggerated fear, but has a right to insist upon clean and decent precautions.

3. The sanitary conditions of hotels, lodging houses, theaters, churches, schools, ambulance and passenger service, should be under the control of the health department, and house cleaning should be accomplished as far as practicable by the vacuum system.

4. Marriage with a tuberculous person should not only be discouraged, but prohibited by law. A tuberculous mother should not nurse or kiss her infant, and in the selection of a wet nurse a certificate of health should be demanded.

5. Isolation of tuberculous patients should be insisted upon in hospitals, asylums, and public institutions. In private life the patient should occupy at least a separate bed, use separate eating and drinking utensils, and neither receive or give kisses. Careless and unteachable cases should be cared for in hospitals.

6. Government inspection of dairies and of dairy and meat products, for the prevention of bovine infection, is called for. Until this is accomplished, milk and cream should be heated to 140°F. for 20 minutes, cooled quickly and kept cold, and all meats should be cooked.

REPORT OF THE EXECUTIVE OFFICE FOR THE YEAR ENDING APRIL 30, 1915

In spite of financial depression, war scares, and apparently unfavorable conditions in various parts of the country, the year just closing has been an unusually successful one for The National Association for the Study and Prevention of Tuberculosis. The Association has been able to undertake or carry to completion many activities, perhaps more than in any past year of its existence, and it has received from directors, members, and an interested public such support as to greatly encourage the Executive Office. It is a pleasure, therefore, to report to you in detail some of the activities of the Executive Office and some of the plans for future development of the work of the Association.

On July 1, in accordance with a resolution adopted by the Executive Committee on June 22, the speaker assumed the responsibilities of the executive secretaryship of the National Association under a special arrangement whereby he gives a sufficient part of his time to the Executive Office, while continuing his residence in Philadelphia. This arrangement has been made possible by the loyal and able support of Mr. Jacobs, the Assistant Secretary, and all other members of the staff.

Among the distinctive pieces of work carried on by the Association during the past year have been the following: The formation of a series of sectional conferences; the organization of a special Committee on Organized Labor and Coöperation of Workingmen; and the outlining and beginning of a campaign of education for medical practitioners. We shall take up these and other activities of the Association more in detail.

I. SECTIONAL CONFERENCES

By authority of a resolution adopted by the Executive Committee on June 22, 1914, four sectional conferences were carried on last fall under the direction of the Executive Office. Three of them were entirely under the control of the Association, and one partially under our control. These conferences were the Mississippi Valley Conference held at St. Louis, October 6–8; the North Atlantic Conference held at Philadelphia, October 16; the New England Conference held at Bangor, October 22, and the Southern Conference held at Atlanta, November 30. The success of these conferences was unqualified, even though the attendance in two of them was not as large as had been expected. The success has led the Board of Directors to authorize the organization of similar conferences during the coming year, and plans are under way now for five conferences to be held respectively at Springfield, Mass.; Albany, N. Y., Columbia, S. C.; Indianapolis, Ind., and El Paso, Texas. These

conferences have proven particularly valuable in providing a forum where peculiar local problems, such as, for example, that of the negro in the South or the migratory consumptive in the Southwest, can be discussed, and also where anti-tuberculosis workers living in the same district can meet one another in more intimate way than would be possible at the larger national meetings. Another advantage is that many who could not attend the national meetings are able to attend these conferences nearer at home.

II. LABOR COMMITTEE

In order that the National Association might promote more intelligent interest on the part of labor unions and other groups of workingmen in the anti-tuberculosis movement, and in order also that anti-tuberculosis societies throughout the country might utilize the various labor union groups to the best possible advantage, early in last year the Board of Directors authorized a special Commitee on Labor, of which Dr. Theodore B. Sachs of Chicago, was appointed chairman. This committee as at present constituted consists, in addition to Dr. Sachs, of Dr. David R. Lyman, Wallingford, Conn.; Dr. William Charles White, Pittsburgh, Pa.; Mr. Samuel Gompers, Washington, D. C.; Mr. George Perkins, Chicago, Ill.; Mr. Austin Garretson, Cedar Rapids, Ia.; and Hon. John Mitchell, New York City. Following out the suggestions of the Committee, the Executive Office has issued a series of press bulletins especially designed for labor papers. Six such bulletins have already been issued and arrangements have been made to put them out at monthly intervals. These bulletins have been unusually well received by labor papers and are being published widely. The opportunity of developing these activities to a special department of work of very great importance to the tuberculosis campaign is fully recognized by the Committee and the Executive Office.

At the request of the Board of Directors, the Executive Office was represented at the meetings of the American Federation of Labor and the International Labor Press Association in Philadelphia last fall and as a result of the presentation of the plan of coöperation, a resolution was adopted endorsing the work of the Association and calling upon all of the constituent unions allied with the Federation to give their support to the work which the Association is doing. In addition to these activities, under the direction of the Labor Committee, a special study of certain experiments in coöperation between workingmen and the anti-tuberculosis campaign is being made. This study embraces such experiments as that carried on in certain Connecticut cities where the unit plan is in operation; the Overlock plan; the Labor Pavilion in Albany; and the Trade Union Sections of the Buffalo and Newark Anti-tuberculosis Associations, besides a number of other similar movements. This pamphlet will be published as soon as all of the data can be procured and put into proper form.

III. EDUCATION OF MEDICAL PRACTITIONERS

As a result of a growing demand from various parts of the country and from different groups of individuals including physicians and laymen, the Executive Committee on January 9, 1915, authorized the inauguration of a special movement for the education of medical practitioners. As the first step in this movement, the Executive Office got in touch by mail with the following groups: the leading medical colleges of the country, the principal training schools for nurses, State medical societies, and anti-tuberculosis associations, particularly in communities where medical colleges or nurses' training schools were located. The response to these letters has revealed two things: first of all, a cordial appreciation of the effort which the Association is making to raise the standard of medical and nursing education with reference to tuberculosis, and secondly, a striking lack of facilities and courses in proper training along the lines of tuberculosis in technical schools for physicians and nurses. A definite plan of procedure has not yet been worked out, but it is hoped in the near future to be able to present to all of the various organizations that are willing to coöperate a working plan which will fit their own peculiar conditions.

As a part of the general plan, and by authorization of the Board of Directors, Dr. William Charles White appeared before the Association of Medical Colleges in Chicago and presented the need of more tuberculosis education. His address was well received and a resolution approving the plan outlined was adopted.

At a meeting of the Board of Directors on April 16, a committee, of which Dr. James Alexander Miller of New York is chairman, was appointed to consider the preparation of a special handbook on tuberculosis designed for the use of medical practitioners, this book to contain in brief but comprehensive form the latest and most authoritative information on the subject of tuberculosis, including medical and social phases of the subject which the average medical practitioner should know. This committee is now working on the subject.

IV. COMMITTEE ON PAMPHLET ON CARE OF THE TUBERCULOUS PATIENT

In accordance with a resolution adopted at the annual meeting by the Board of Directors in May, 1914, a committee was appointed with Dr. John H. Lowman of Cleveland as chairman to prepare a special pamphlet on the care of the tuberculous. This pamphlet was to be a standard for tuberculosis literature, and was to contain the latest and most approved medical information on this disease, written in such form that it would be intelligible to any layman. It was designed to prepare the pamphlet for production in coöperation between the National Association, the United States Public Health Service, and the American Medical Association. Owing to illness, Dr. Lowman was unable to carry on the work, and the delay caused on this account has retarded the progress of the publication. Dr. Charles L. Minor

of Asheville is now acting as chairman and the work is progressing. It is hoped that the pamphlet will be ready for publication some time during the fall. Announcement of it will be made from the Executive Office at that time.

V. SPECIAL STUDIES

The pamphlet entitled "The Influence of Tuberculosis Institutions on the Value and Desirability of Surrounding Property" was issued by the Association on June 18, 1914. It met with instant approval and has since demonstrated its value in a number of local campaigns, notably one in California where a referendum vote in favor of the establishment of a local sanatorium was carried in the face of bitter opposition.

The series of papers read before the Advisory Council at the last meeting of the Association were reprinted in the form of a special pamphlet entitled "Medical Examination of Employes" and were distributed to the extent of over 4000 in various parts of the country, through the Executive Office, through the National Safety Council in Chicago, and through various other channels. The effect of this pamphlet and of the meeting at Washington have been felt in a number of ways, notably in the inauguration of movements for medical examination of employes in such cities as New York, Newark, Grand Rapids, and Seattle.

The pamphlet entitled "Tuberculosis Legislation in the United States" was issued by the Executive Office on March 18, 1915. This pamphlet consists of 64 pages and has been designed as a handbook for legislators and others who are interested in tuberculosis legislation.

A special study of dispensary administration and methods is being made for the Executive Office by Miss F. Elisabeth Crowell, Executive Secretary of the New York Association of Tuberculosis Clinics. Miss Crowell's study is based on a series of reports received at the Executive Office in response to questionnaires sent out in coöperation with the Out-Patient Committee of the American Hospital Association. Miss Crowell's report should be ready for publication in the fall of this year.

A large amount of data has been collected by the Executive Office through a special detailed questionnaire dealing with anti-tuberculosis association organization, methods and procedure. This data will be collated and put into pamphlet form as soon as possible.

As a companion study to this and the dispensary study, it is planned as soon as possible to prepare a study of sanatorium methods and procedure.

The *Transactions of the Tenth Annual Meeting* were issued earlier than ever before. It is planned to publish as a separate pamphlet, but at the same time with the next volume of *Transactions* of the Association, an index for the ten preceding volumes. It is also planned, for the benefit of those who wish it, to make provision for a cloth binding for the *Transactions*. Those who care for this binding may have it at an additional charge of about fifty cents.

VI. MOTION PICTURES

The value of motion pictures as an educational medium in the tuberculosis campaign is now so well established that it hardly needs any discussion here. It is perfectly obvious that the presentation of a dramatic story with certain educational features to audiences ranging from one million to five million in a single week must be productive of good results.

The Association has had five different reels of films, produced at various times by Thomas A. Edison, Inc. Two of the reels are now worn out and cannot be replaced because of the destruction of the negatives by the recent disastrous fire at the Edison plant. The three usuable prints which the Association has have been in almost constant use during the past year, having traveled from the Rocky Mountains to the Atlantic Coast and from the Canadian Border to the Gulf, and having been shown in all sorts of communities—industrial, mining, rural, etc.

In coöperation with the Universal Film Company, the largest single producing company in the motion picture business, and after a series of negotiations extending over months, the National Association has finally secured the production of a remarkable four reel motion picture, released for June 18, 1915, which has been shown in private exhibition during this meeting. The Association was able to supervise the production of the picture from its very inception in scenario form, and considers that the anti-tuberculosis movement is fortunate in securing such a dramatic and well constructed medium of education. The picture will be shown in all of the theatres controlled by the Universal Film Company, which aggregate about half of those in the country. It will also be available for use of State departments of health, anti-tuberculosis associations and other groups, particularly for non-theatrical exhibitions.

In addition to this picture, the Association is planning to complete arrangements in the near future for the use of another six reel special feature picture, produced by a firm in Los Angeles, which will be shown particularly in the larger theatres throughout the country and which will supplement the Universal film.

It is a pleasure to express our appreciation to Thomas A. Edison, Inc., and to the Universal Film Company for the help they have given in the preparation of these pictures.

VII. MOVEMENTS OF FIELD SECRETARIES

Since the last annual meeting, the field secretaries of the National Association have operated in more than twenty different States with uniformly good results.

Mr. Dixon Van Blarcom began the year with work in Oklahoma. After a successful campaign there, in which he was able to prepare a public health exhibit and inaugurate a State-wide campaign, he went to Arkansas. In this State he was valuable in the work in Little Rock, where a survey of local conditions, later published in pamphlet form, has been productive of

lasting results in the anti-tuberculosis movement. Mr. Van Blarcom's visit to South Dakota in June was timely and valuable. He was able to stimulate the local work there to such an extent that interest throughout the State in the anti-tuberculosis movement became evident, and when the Red Cross Christmas Seal Campaign for 1914 closed, the thousand dollar sale of 1913 was more than tripled. With this sum of money, a field nurse has been engaged and has been doing some of the most interesting pioneer work of any nurse in the country. It is planned in the fall to engage another nurse if one can be secured. The campaign in South Dakota is now on a sound basis.

Following the vacation season, Mr. Van Blarcom took up his work in the fall in Florida, Louisiana, Mississippi, Alabama, North and South Carolina, and West Virginia. The organization of Red Cross Seal and anti-tuberculosis work in Florida was practically the first state wide effort of its kind ever carried on in this State, and has already been productive of good results, not only in private work, but also in the stimulation of the State Board of Health to renewed activity. Similar good effects have been felt in other States of the South visited by Mr. Van Blarcom.

Following the Christmas holidays, Mr. Van Blarcom was retained in the office of the Association except for a few weeks spent in New England studying the workingmen's anti-tuberculosis organizations in Connecticut and Massachusetts. In March he was sent to Indiana where he was able to adjust certain local conditions in a satisfactory manner. Following this visit, he went to Ohio where his work is highly spoken of.

About April 1, Mr. Van Blarcom resigned his position with the Association and accepted the executive secretaryship of the San Francisco Association for the Study and Prevention of Tuberculosis. The National Association takes this occasion to acknowledge the splendid sevices which Mr. Van Blarcom has rendered for the last two years to the anti-tuberculosis movement throughout the country.

Before the resignation of Mr. Van Blarcom was received, the Association had engaged Mr. Charles M. DeForest of New York City, formerly connected with the New York State Charities Aid Association, as an additional field secretary and national Red Cross Seal sales manager.

Since his appointment and up to the time of this meeting, Mr. DeForest has been in Illinois, Wisconsin, Iowa, Minnesota, Idaho, and Oregon, in all of which States he has been able to render satisfactory service in connection with the reorganization of the anti-tuberculosis work and the stimulation of the Red Cross Seal campaign.

By the authority of the Board of Directors, the Executive Office has engaged Mr. Frederick D. Hopkins as a field secretary, his duties to be assumed about August 1. Mr. Hopkins comes to us from the New York State Board of Charities where his experience has developed a special fitness for our work.

VIII. PUBLICITY

During the year ending April 30, the Association has issued twenty-one press bulletins. Owing to the large amount of war news being carried by

the papers throughout the country, the Publicity Bureau, in common with similar organizations throughout the country, has found difficulty in getting free publicity in the ordinary newspapers. On this account, a smaller number of bulletins have been issued than usual. The satisfactory reception of these bulletins, however, has been gratifying. During the Red Cross Seal and Tuberculosis Day campaigns, special boiler plate or ready-to-print material was issued in considerable quantities with good effect. The publicity received during these movements was larger than ever before, another fact which has influenced the office in reducing the number of regular bulletins and concentrating its efforts on special campaigns. The co-operation of the American Press Association and the Western Newspaper Union, as well as a number of other syndicates, in the spread of special material during the Red Cross Seal and anti-tuberculosis campaigns has been particularly gratifying. Through these channels the Association and the anti-tuberculosis movement has received a large amount of free publicity.

The Confidential Bulletin of the Association was changed in name beginning with the October number and since that time has been published monthly as the *Bulletin of the National Association for the Study and Prevention of Tuberculosis*. Since the change, the *Bulletin* has been issued in printed form and has been entered as second class matter with the Post Office Department. The result of these changes has been that a much wider distribution of the *Bulletin* has been possible at a very small increase in cost. The value of the *Bulletin* has also been greatly enhanced as a means of communicating with anti-tuberculosis associations members and workers throughout the country.

IX. TUBERCULOSIS DAY

As one of the features of the Tuberculosis Day campaign last fall, the Association conducted a census of a considerable number of churches with an effort to ascertain the mortality and morbidity from tuberculosis in congregations throughout the country. Replies were received from nearly 3000 clergymen representing nearly 1,603,300 communicants, which showed that there was a large mortality from tuberculosis among church members throughout the country and that the problem of the average pastor in visiting the tuberculous sick in his congregation was a serious one. This material furnished valuable publicity during the campaign. While it is impossible to get an accurate figure as to the number of organizations or institutions participating in the Tuberculosis Day movement, it is estimated that not less than 100,000 churches, schools, and other organizations took part in this campaign. The Executive Office distributed over 150,000 pieces of literature. Another immediate effect of this and other Tuberculosis Day campaigns during the past few years has been the rapid extension of similar movements on a broader scale in various parts of the country. "Health Weeks" and special "Health Days" are now becoming common, both in conjunction with the Tuberculosis Day movement and at other times. The Association's propaganda in this respect is bearing fruit.

X. RED CROSS SEALS

Last fall when the Red Cross Seal campaign was beginning, many of those who were connected with it predicted a large falling off in the sale, due to the European War and the consequent financial depression. Inasmuch, however, as the American Red Cross and the National Association had already committed themselves to the sale and had spent considerable money in preliminary work, it was felt desirable to go ahead and push the movement as hard as possible. The results justified the wisdom of this procedure, since, instead of a falling off, the Red Cross Seal sale shows a gain of over 22 per cent., and instead of the 45,000,000 seals in 1914, the 1915 sale will show a total of practically 55,000,000 seals, representing $530,000 for the anti-tuberculosis campaign. The reasons for this signal increase in a year when many charitable organizations were suffering financially appears to be first of all due to the much more efficient organization which the National Association was able to perfect throughout the country; and, secondly, to the increased spirit of giving which the enormous appeals for war relief had apparently provoked.

Plans for the seal campaign of 1915 are well under way. Appointment contracts have been sent to most of the agents of last year. The Christmas seal design has been accepted and the printing contracts have been let, the initial order being for 125,000,000 seals. To those who are not familiar with this movement, some idea of its magnitude may be gained from this one figure. As the result of action taken by a conference of Red Cross Seal workers held in February, the American Red Cross, at the suggestion of the Executive Office have promulgated a series of rules and regulations for the especial guidance of those who sell seals by mail. These rules are being made part of each agent's contract.

XI. Y. M. C. A. EXHIBIT

At the request of the International Committee of the Young Men's Christian Association, the Executive Office, by authority of the Board of Directors, have prepared a special exhibit on tuberculosis for use of the Y. M. C. A.'s throughout the country. This exhibit is an independent unit in a general public health exhibit which the International Committee is circulating among its constituent organizations in various parts of the country. It is urged that the anti-tuberculosis associations wherever possible co-operate with the Y. M. C. A. where this exhibit may be shown.

XII. AMERICAN SANATORIUM ASSOCIATION

An arrangement for closer affiliation between the American Sanatorium Association and the National Association has been effected. By this arrangement the Sanatorium Association whenever possible will hold its annual spring meeting with the National Association. Its program and transactions will be published with those of the National Association, and the closer working of the two organizations will be perfected.

XIII. PUBLIC HEALTH CONGRESS

At the last meeting of the American Public Health Association a resolution, presented by the Executive Secretary, was adopted authorizing the formation in 1916 of a National Public Health Congress to bring together at one time and in one city, all of the principal national organizations doing public health work in the United States. The plans for this congress are now being worked over by a special joint committee representing more than forty different national organizations.

XIV. MEMBERSHIP

The membership of the National Association shows a steady and consistent gain during the past year. On April 30, 1914, there were 2219 members in the Association. On June 1, 1915, there were 2419, a gross gain of 312. Allowing for resignations, those who have been dropped, etc., the net gain is 200. The receipts for membership dues during the past year indicate a slight falling off, which may be accounted for probably by the financial condition of the country.

XV. FINANCES

The year ending April 30 was the first year that the National Association operated on a budget. The estimated receipts for the year just closed were approximately those realized, while the expenditures fell below the estimate. It has afforded the Executive Office no little satisfaction to know that they were able to figure in advance what their receipts and expenditures would be. For the coming year the budget of the Association shows a total of $37,393 for expenditures as against $36,400 for receipts. If the budget in its present form be made effective, the work for the next year will show a marked increase over that of previous years.

XVI. FIELD SECRETARY FUND

During the past year a special effort was made to secure contributions from the State and local associations in sums ranging from $25 to $100 or more for the development of a staff of field secretaries. It spite of several appeals which were sent to the various associations, the total amount received and subscribed, $1465, is not very encouraging. It was estimated at the beginning of the campaign that approximately $5000 to $6000 should be received in this way. In this instance, our estimate was wide of the mark. While none of the associations that replied to the letters sent out from the Executive Office have criticized the plan unfavorably, and while many have expressed a wish to co-operate, the number that have contributed has been surprisingly small, only 35 out of more than 1000. It would seem that a large number of anti-tuberculosis associations should be willing to contribute to the support of a field secretary, even though an immediate and direct return from such

service might not be in sight. The National Association's entire work is for the benefit of the local associations, whether it be through field secretaries or any other means. The amount of work that can be done, however, is measured simply by the support which the Association receives. The National Association should have an annual budget of $50,000. At the present time it is hard work to raise a budget of $36,000. It is hoped during the coming year that associations and individuals who have the interest of the Association at heart will give of their services and money more liberally than heretofore to promote the work of the organization.

In conclusion, it is a pleasure to acknowledge the continued support of the Russell Sage Foundation, without whose help the work of the Association would have to be curtailed by at least one-third.

The generous and cordial co-operation of our sister organization, the American National Red Cross has done much to stimulate the anti-tuberculosis campaign throughout the country. This expression of appreciation will acknowledge our debt.

Respectfully submitted,

CHARLES J. HATFIELD,
Executive Secretary.

ADVISORY COUNCIL

Chairman

CHRISTEN QUEVLI, M.D.

Tacoma, Wash.

INTRODUCTORY REMARKS*

The Chairman: In behalf of the Washington Association for the Prevention and Relief of Tuberculosis, the Anti-tuberculosis Leagues and Committees of Washington and the Pacific Northwest, it is my pleasure and privilege as president of the State Association to welcome this splendid body of men and women who compose The National Association for the Study and Prevention of Tuberculosis.

The main function of the Advisory Counsel is to bring before the public each year a subject of equal interest to the laity and medical profession. After careful deliberation as to what subject to choose for this session of the Advisory Counsel none seemed to be so important as child welfare in relation to tuberculosis. Knowing that in some countries as high as 90 to 97 per cent. of children are infected before the age of 14, and as we now believe that a great number of deaths in adults are simply a lighting up of a childhood infection, it is plain that no other topic dealing with the eradication of tuberculosis can compare in importance with this.

Better to discuss this subject it has been divided into 3 headings: first, the Child and the Home, by Dr. George M. Kober of Washington, D. C.; the Child and the School, by Sherman C. Kingsley of Chicago; and the Child and the Community, by Dr. Edward O. Otis of Boston. The discussion of these papers will be opened by Dr. Charles Browning of Los Angeles, and Mrs. Josephine Preston and Dr. Thomas D. Tuttle, of the State of Washington.

These three vital influences surround the life of every child and shape its future. Who can estimate the influence of the home upon the mental and physical welfare of the child? It is, in brief, a power that shapes the affairs of a nation. After six years of life the second influence is brought to bear upon the child's development. The school should awaken in every child an understanding and interest for a sane, normal, and healthy life, and the result will be a very great reduction in the untimely funerals of the nation. The young would not then be snatched away by tuberculosis and other preventable diseases but when their life work was done death would come to them as a friend to give them rest. The teaching of hygienic measures in schools has assumed a more practical course in the last few years, but is still far from adequate. Upon the community, however, perhaps rests the largest responsibility in the welfare of the child. The character of the home, the efficiency of the schools, the standard of public officials and the management of public institutions, exert both a direct and indirect influence iupon the child's future.

To sum up, it should be the sacred duty of the home, the school, and the community not only to teach the dangers of infection to the children but also

* Hon. Hiram Gill, Mayor of Seattle, gave a brief address welcoming the delegates on behalf of the City of Seattle.

to surround them with an environment that will produce a body so strong and healthy that it can to a great extent resist disease. The only way that I can see to win a decisive victory in the warfare we are waging against this most dreadful and prevalent of scourges (tuberculosis), is to have the home, school, and community see and do their duty. To that end authoritative information should be given the public; and it is now with great pleasure that I introduce to you Dr. George M. Kober, President of the National Association for the Study and Prevention of Tuberculosis, who will present the first paper.

THE CHILD AND THE HOME

By George M. Kober, M.D.
Washington

It is generally agreed that the physical and mental vigor of a nation depends upon the environments of childhood and youth, when the whole organism is plastic and peculiarly susceptible to external and internal impressions. The importance of the subject is apparent when we remember that about one-third of the population consists of children up to the age of 15 years.

There is every reason to assume that in most of the infectious diseases, but especially in tuberculosis, in addition to the germ, it requires also a suitable soil for its proliferation and destructive effects. It is certainly startling to contemplate that post mortem examinations conducted by Hamburger and Monti, in the Vienna hospitals revealed the fact that 95 per cent. of the children who came to autopsy, largely the children of the poorer classes, are already tuberculous by the time they reach the twelfth or thirteenth year of life. While this percentage may not be applicable to all classes of children, it is believed that there is special danger from infection in childhood, which may remain dormant until the period of adolescence and maturity is reached, or until the body has been weakened from any of the debilitating influences. Among the most important predisposing causes to tuberculosis in children are such diseases as measles and whooping cough, anemia and malnutrition.

An inherited predisposition, characterized by a delicate physique, narrow chest, and general vulnerability of the tissues, so frequently observed in children of consumptive parents, also plays an important role.

A rational prophylaxis would suggest that in order to bear healthy children the parents themselves must be healthy, hence marriage with a tuberculous person should not only be discouraged but prohibited by law.

Our first duty is to see that the child receives pre-natal care, which can only be done by proper protection of the mother in the way of suitable instruction in personal hygiene, rational food, and improved housing and factory conditions. While this is desirable for all classes, it is absolutely essential in the case of our least resourceful people. It has long since been recognized that excessive work and insufficient or improper food is one of the most important causes of premature births and delicate babies. In countries like Germany and France steps have been taken to secure this protection for female wage earners, with the result that there has been a marked improvement in the nutrition and gain in weight of new born infants. No one can doubt that a well cared for and properly nourished mother will, in the majority of instances, be able to fulfil her maternal functions and obviate the necessity of artificial feeding, which so frequently handicaps the child for life.

House and Home.—A healthful home is essential for the welfare not only of the child, but of all the inmates. With the excellent motor facilities, there is no reason why crowded tenements should be chosen, and preference should always be given to individual homes, or apartments, in not exceeding two story tenements. The Germans have an old but true proverb "Where the sun does not enter, the doctor surely will." Dark, gloomy, and damp houses should be avoided. The children are anemic and as puny as plants reared without the stimulating effects of sunlight. The death rate is often double and treble than that of healthful homes. A damp house renders the whole atmosphere damp, abstracts an undue amount of animal heat, lowers the general vitality of the system, and favors the development of catarrhal conditions which render the system more vulnerable. The tubercle bacilli, clinging to floors, walls, etc., from carelessly expectorated sputum, also finds in damp and dark places a more favorable environment to retain their vitality.

Moldy spots on the walls and ceilings, and a close musty odor indicate dampness, and cheap rents should prove no inducement to occupy such quarters. Leaky roofs and drain spouts, or a pile of ashes against a brick wall, may keep the house damp, and the causes should be promptly removed. In all such instances, as well as in the occupancy of a recently constructed house, it is very desirable to dry out the house by heat and open windows.

Since we know that overcrowding favors contact infection it is important that even the most modest homes afford not less than 500 cubic feet of air space for each inmate. Ventilation is always necessary but open windows or preferably sleeping porches, are especially indicated at night, as nothing can take the place of pure fresh air in small quarters. Night air, contrary to popular opinion, is not unwholesome. The only danger is from mosquitoes, which should be excluded by suitable screening. I have seen delicate infants develop into robust, healthy children by the benefits of fresh and even cold air, and there is absolutely no danger provided the body is kept warm by sufficient clothing.

Household Dust.—There should be no accumulation of dust in any part of the premises, because dust and germs always go hand in hand. Uffelmann found that while the outer air contained only 250 germs per cubic meter, the air of his library contained 2900, of his sitting room 7500, of his bedroom 12,500 and the air of a living room of a wageearner's family as many as 31,000 germs.

If the dust should happen to contain the germs of tuberculosis, from carelessly expectorated sputum, or of any other infectious disease, which may have been carried into the house upon the soles of foot wear, or the bottom of skirts, such dust may prove a source of danger, especially to children.

Hygiene condemns therefore all interior ornamentation and unnecessary furniture which will serve as dust and germ traps, such as heavy cornices, elaborate mouldings of door and window frames, wardrobes, cumbersome draperies, tacked down carpets and matting. Hygiene on the other hand approves of neatly polished floors, with small rugs which can be easily taken up and frequently cleaned outdoors; curves instead of cornices and angles, smooth and non-absorbent walls instead of embossed wall paper, and simplicity of furniture.

House Cleaning.—The object of house cleaning is primarily to get rid of the dust and germs. In sweeping it is desirable to open the upper windows, but to keep the lower sashes and the door leading into the hall closed, so that the dust may not be wafted back into other parts of the house, and into the noses and lungs of people that are about, because the outer air invariably rushes in when the lower sashes are raised, while the warmer air of the room passes out at the top when the upper sashes are lowered. Sweeping should be done by means of hair brooms, carpet sweeper, or vacuum cleaners. The dusting, in the absence of vacuum cleaning, should be done with a soft damp cloth, frequently rinsed. The feather duster does not remove but simply displaces the dust. If the cracks in floors have been neatly filled, and the floors oiled or waxed, they can be cleaned with a damp cloth much more effectively than by the tiresome process of scrubbing.

Temperature.—The most healthful room temperature in cold weather is between 65 and 70°, overheated rooms predispose to colds and should be avoided. Great harm may result from the escape of furnace gases. Coal oil or gas stoves cannot be recommended, unless provisions are made to carry off the products of combustion.

Special attention should be paid to the exclusion and destruction of house flies, mosquitoes, and other insects, for apart from the discomfort produced quite a number of the insects are carriers of disease germs. Where no sewer connections exist, the outhouses should be kept in a clean condition, and the seats provided with lids so as to exclude flies. It is also a good plan to disinfect the vault or receptacle with chlorinated lime or fresh lime wash. A good housewife will be able to transform undesirable living quarters into healthful homes, while filth, neglect, and slovenly housekeeping often convert, even structurally good houses, into veritable hotbeds for disease germs.

Care and Food of the Child.—Next to the habitation, but of equal importance, is the care and food of the child. In order to ensure to the young mother the necessary knowledge Dr. Schenker has urged the establishment of compulsory continuation schools, for girls between 16 and 20 years old, where instructions regarding the duties and rights of a woman as wife and mother should be given. We consider this a most excellent suggestion, provided the girls have also had a course of thorough training in domestic science in the public schools Apart from the fact that the average expenditures for food are larger than for any other single item, the question of well selected and properly cooked food, and of "home making" generally, is of the utmost importance to the health and morals of the family.

With a more thorough education along these lines, and close attention to pre-natal and infant welfare work, it is reasonable to assume that one of the immediate results will be to secure for the infant its natural food, mother's milk, and that the number of willing mothers who have no milk will be greatly diminished. If for any reason artificial feeding is necessary, it becomes a medical and nursing question and it is clearly the duty of medical schools and training schools for nurses to equip their graduates for this important life-saving work.

After the weaning period the question of suitable food for children between

the age of 2 and 6 years is still important. In the way of animal food, milk, tender roast meat, fowl, and soft boiled eggs are recommended. Whole wheat bread buttered, macaroni, rice, zweiback, well cooked breakfast cereals, soups containing some of the cereals or meal of legumes, and mashed potatoes are most readily assimilated. Rich gravies, coarse vegetables, salads, large amounts of potatoes and deserts should be forbidden. Children who have been brought up on simple, nutritious, well-cooked and masticated food will generally enjoy good health. Between the age of 6–15 years the appetite and digestive powers have grown, they, however, ought not to be taxed by the introduction of coarse, indigestible, and improper food. Highly seasoned dishes, alcoholic beverages, coffee and tea should be avoided at all ages. Cocoa is less objectionable than coffee and tea, and upon broad principles even the use of ice cream and soft drinks should be discouraged, since many contain harmful stimulants. Every tendency to the use of tobacco should be promptly checked.

The Care of the Skin.—A normal cutaneous function is doubtless of great hygienic importance as shown by the occurrence of many diseases following its suppression. Since the functions of the skin depend not only upon its anatomical intactness but also upon cleanliness, and a proper tone of the cutaneous vessels and nerves, a rational culture of the skin demands (1) that it should be freed regularly from its secretory products and particles of dirt; (2) that the cutaneous nerves retain their normal excitability, or when impaired that they regain their tone; (3) that we assist the skin in its heat regulating functions, so that it may not be overtaxed. All of which may be accomplished by ablutions, baths, and suitable clothing. Space will not permit me to enter into these important topics of child hygiene, which ought to be systematically taught in the continuation schools referred to.

It may be stated, in general terms, that a bath for infants should be between 98 and 100°F. and not exceed five minutes. For children over one year the temperature may be gradually reduced from 98 to 86°.

The clothing should be adapted to the age of the child, climate, and season. At the expiration of the third year a distinctive dress for boys and girls is usually chosen, and the patterns now in use show generally good judgment on the part of the designer. The question of hardening the skin to external impressions by cold baths and exposure in an almost nude state to the air and sun, is an important one. Much good may be accomplished when we proceed methodically and gradually adapt the child to climatic and seasonable influences during out-door exercise. Personally I believe that bare feet and general exposure to cold possess hygienic advantages, when children are engaged in out-door exercise, but they certainly need protection in the way of suitable clothing, when in an inactive state.

Bed and Bedding.—Even new-born infants should occupy a separate bed, apart from the danger of being overlain, the air of the lying-in room is usually impure and in case of a consumptive mother the danger of contact infection is ever present. The best baby crib is one made of rattan or wicker work, preferably without rockers. The bedding should consist of a hair mattress, a soft pillow, and woolen blankets, properly guarded, while in cold weather a

down quilt may be a desirable substitute for blankets. The position of the child should be nearly horizontal, as any considerable elevation of the head interferes with normal expansion of the chest. The child should be well protected, but the bedding should not be fastened in such a manner as to interfere with the movements of the extremities.

It is well known that healthy, new-born, infants sleep all day except while nursing; about the third and fourth week of their life they remain awake for one quarter of an hour, in addition to their nursing; in the seventh or eighth week they remain awake one-half hour, and in the fifth month about one hour; but even when a year old a child sleeps more than half of the twenty-four hours. During the second and third year it sleeps from 10 to 12 hours at night and from 2 to 2½ hours in day time. After the completion of the third year, the necessity for sleep in day time ceases.

The importance of pure air for children who pass so much of their time in bed is self-evident, and a sleeping porch or well aired bed room should be chosen, at an early period. With suitable bedding, sleeping caps, and mittens there is no danger of catching cold.

Exercise of the Child.—The movements of a child during the first three months are purely automatic, impulsive, and reflex. The first voluntary movements are seen about the beginning of the fourth month, when the child reaches for objects held before it. Attempts to get up from a recumbent position may be observed during the fifth or sixth month and attempts to stand up or walk along a chair or other support are usually made between the tenth and twelfth month. If a child does not learn to stand up by the fourteenth month there is reason to suspect muscular weakness and rickets, occasioned by improper food and environments.

No attempt should be made to encourage sitting, standing, or walking until the child's own movements indicate a desire and capacity so to do. A simple plan is to place the child on a rug surrounded by pillows and let it execute its own movements. After the child begins to walk, it is also a good plan to leave the muscular development to the instinct and volition of the child, care being taken to prevent injury from bumps and falls. Later it will find ample opportunity for exercise in the romps and plays of child life, while still later during the school period, systematic development of the body should constitute an important part of the educational system.

It is to be hoped that by faithful attention to the hygiene of the child in the home, the first and most important steps will have been taken, not only in the prevention of early infections and numerous physical defects, and permanent disabilities, but also in the development of a strong and vigorous race both mentally and physically, capable of resisting disease in general.

DISCUSSION ON PAPER BY DR. KOBER

Dr. Charles C. Browning, Los Angeles: Dr. Kober has again sounded the keynote in the campaign against tuberculosis, *Education.*

When we consider the opposition which still exists against prophylactic measures, the value of which is as easily demonstrable, as vaccination against

small-pox, typhoid fever, etc., and the use of anti-toxin in diphtheria as a prophylactic and therapeutic agent, we can readily appreciate the difficulties to be met in unifying opinion regarding the disease which presents so many phases in its clinical course, as does tuberculosis. But when we consider that in spite of these difficulties, how great benefits have come to mankind through these efforts, we are encouraged to continue our efforts and welcome any new suggestions from men who are thoughtful and experienced, as is our honored president.

Marriage should be the establishment of a home. That persons entering this state should be in a condition of physical health, I think is admitted by all.

Satisfactory regulation of marriage of tuberculous persons is a goal to be striven for, but difficult to attain. When we consider the large percentage of individuals who are infected, it becomes evident that it is impractical at this time to prevent the marriage of all infected individuals without recasting social conditions. It then becomes a relative restriction, confined to those who have at the time of proposed marriage active symptoms, or who have a history of having had such active symptoms as may appear to be wise by those who undertake the regulation.

Homer, Hamburger, von Berhing and others are of the opinion that the majority of cases of pulmonary tuberculosis of adults occurs in an individual who was infected in childhood, and remained latent until some stress later in life caused it to become active. We know these conditions manifest themselves most frequently in early manhood and womanhood, frequently after marriage. Examinations would probably detect some of these latent cases, but not all, nor do I believe a majority. Should they be detected, who can tell which ones will develop active conditions; the majority do not.

After having used due diligence in this regard, our work of prophylaxis should be directed toward sanitation in the home which is to receive the infant and continued through infancy, by protection from exposure to infectious individuals and infected food. Care of respiratory and digestive tracts is essential. Protection against acute infections (colds) of the nose, throat and bronchi is important. The teeth should be watched, as important work in this line points to decayed teeth as a possible portal of entry. Therefore, cautions should follow the child into school. It is here we may see the children en masse and observe many who have escaped observation earlier. Many will have been infected before reaching this age, but much can be done to aid in bringing about an arrestment. Personally, I have felt encouraged by the work of Maraglino and others, so hope for good results from vaccination against tuberculosis.

The introduction of domestic science courses into our schools and the continuation schools referred to, will do much toward increasing the hygenic educational facilities and become important factors in the fight against tuberculosis.

However, there are many homes established today and many more will be established, the mothers of which have not enjoyed such privileges. To these, I think it is the State's duty to provide opportunity. This can be done through visiting instructors, the visiting nurse being most valuable.

This work should be extended through the rural districts. It is quite as important here, in proportion to the population reached, as in the cities, and I believe is capable of reaping a richer harvest. The results in Ireland in this work have proven most interesting; here the visiting instructor has been one of the many important factors. The mortality from tuberculosis has been reduced from 2.7 per 1000 living in 1907 to 2.2 in 1911—nearly 19 per cent. in 4 years. There is reason to believe that under the hygienic conditions of the average home, it is exceedingly rare for adults to become infected. (This is probably less frequently true in the crowded tenement, as conditions favoring infection are more pronounced.)

If this is true, the average individual is not likely to become infected after marriage. The stresses following marriage, although not directly brought about by it, frequently determine an attack.

Tuberculosis has justly been called a house disease. It is more—it is a home disease—it must be treated there. Institutional care is to be encouraged, but reaches such a small per cent., that it is little more than an emergency measure. The greatest results, prophylactically, will be accomplished in the home.

The beginning of the end of tuberculosis is the protection of the child in the home.

THE CHILD AND THE SCHOOL

By Sherman C. Kingsley
Chicago

There are roundly 20,000,000 school children in the United States. They spend 100,000,000 hours, or 11,415 years in the school rooms of the land every school day, or a total of 2,283,000 years every twelve months. No other agency in our country has such possibilities for training and moulding citizens as the public school. Government, in the United States, concerns itself with the direction and supervision of the individual less than it does in almost any other great nation in the world. Our one notable exception in this regard is the public school. Our compulsory education laws decree that all children must go to school. Our boys and girls are required to occupy school seats for a minimum of six or eight years, and these perhaps the most important years of their lives. During this period they are under the direct observation and largely under the control of teachers who are the duly appointed representatives of organized society.

Our theory in this country is that every child should have at least that modicum of education which is comprehended in the grammar school. We are agreed that those who are to be members of our body politic and who are to have a citizen's part in the daily life and affairs of the United States, need this minimum of formal educational work and the discipline of mind which comes with it. And we are further agreed that a sufficient childhood period should be set apart for the accomplishment of this task and for the physical development which should accrue in these years.

We have awakened to the fact that this theory of at least a grammar school education for every child is not being met, for we now know that less than half of the children of the country ever attain it and that great numbers of those who leave short of this accomplishment, quit school with only a fourth, fifth, or sixth grade preparation. In recent years a procession of over 100,000 children annually have been dealt with in our courts. Probation officers have tried to befriend them, to help them find work, and to secure needed hospital and medical attention. Vocational guidance bureaus try to find employment for illy prepared boys and girls. Settlements have taken children into their evening classes and tried to supplement their fragmentary education. Playground workers, children's clinics, and infant welfare societies are trying to build up the physique of children to a point where they can meet the demands of modern conditions. Health inspection in the public schools has perhaps been the most potent factor in calling attention to the physical welfare of school children. Summaries of reports from medical inspection work in schools reveal the fact that about 60 per cent. of all the school children have physical defects of one kind or another, which interfere with school work and which

should have attention. The work of the physician in this line has been followed by the school nurse and through her services we have learned new lessons concerning the needs of school children and the possibilities of rendering vital service to them through that care and attention which results in the correction of defects of eyes, ears, teeth, noses, throats, and other remediable physical defects.

The service has not stopped with efforts at physical improvement. The acquaintance of nurses and social workers with home conditions, housing, wages, over-crowding, moral conditions in the home and neighborhood, have helped to make clear the reasons why many children do not make satisfactory school progress and why they become discouraged and drop out of school.

More detailed medical studies and observations than those usually provided for in health inspection work have been carried on in a number of cities. Such studies indicate that from 2 per cent. to 10 per cent. of the total school population have physical defects so serious as to render their school experiences practically useless and to make it inexpedient to spend public money trying to educate them, unless something is done to better their physical condition.

Sidney Webb in his book, "The Prevention of Destitution," states the case in this way for England:

"When we get the child to school, knowledge of its condition becomes forced upon the community. The first results of systematic medical inspection are bringing home to our minds what every teacher knows, namely, that a large proportion of the children are not in a fit state to have the public money spent on teaching them, because they are suffering to such an extent from neglect as to be unable to obtain full advantage of the instruction. What emerges from the cautious summaries of the chief medical officer of the Board of Education for England and Wales (Scotland and Ireland being at least as bad) is that out of all six million children in the elementary schools about 10 per cent. suffer from serious defects in vision; from 3 per cent. to 5 per cent. suffer from defective hearing; 1 per cent. to 3 per cent. from suppurating ears; 8 per cent. from adenoids or enlarged tonsils of sufficient degree to obstruct the nose or throat and to require surgical treatment; 20 per cent. to 40 per cent. suffer from extensive and injurious decay of the teeth; 40 per cent. have unclean heads; about 1 per cent. suffer from ringworm; 1 per cent. are affected with tuberculosis of readily recognizable form; and ½ per cent. to 2 per cent. are afflicted with heart disease."

At the close of the school year 1913–14, the health commissioner of Chicago instructed the 100 school physicians of the city to make as careful a study as possible of the children in their respective districts and to make a return to his office on the number of children of the debilitated and anemic type, who in their opinion should have some such special consideration as is afforded in the open air school. This investigation did not pretend to be thorough and complete, but it did give some indication as to the number of such children. It resulted in a list of 5,248.

Dr. Leonard P. Ayres in his book on "Open Air Schools," states that in 1909–10 the city of Boston made an examination of children to determine the number of such children in the Boston schools. Out of 90,000 children there

were 4489, or almost 5 per cent. of the entire membership, who were found to need such care. Dr. Ayres quotes a similar study in Atlanta where 5.18 per cent. of the children were found in a similar condition, and another study in St. Paul where the percentage was 2.7 per cent. These studies are fairly consistent with a number of similar inquiries that have been made. These figures indicate that placing the number of children at from 2 per cent. to 10 per cent. of the total school population is conservative. If 2 per cent. is accepted it would mean 400,000 such children in the United States; if 10 per cent., 2,000,000.

The Elizabeth McCormick Memorial Fund, co-operating with the Board of Education and other agencies in Chicago, has endeavored to become acquainted with the conditions and needs of this type of children in our city and has endeavored on the basis of such knowledge to work out a plan that will, as nearly as possible, give such children a real chance. In the school year 1913–14, nineteen open-air and open window schools were conducted in Chicago, with an enrollment of something over 600 children. The records of 598 of these children were fairly complete and will form the basis of figures to be quoted here with reference to the Chicago schools, during the period covered. Four hundred and fifty of the number were classified by physicians as tuberculous, meaning of the lungs, glands, bones, etc. These children often came from families where some other member of the family was ill with the disease. Cases of open tuberculosis were not admitted to the schools. One hundred and eighteen of these children were suffering from anemia and malnutrition, 30 from heart defects and bronchitis. In addition to the findings on tuberculosis, there were many other physical defects. One hundred and eight of the children had diseased tonsils, 165 had adenoids, 466 decayed teeth, 152 had defective eyes. Then there were ear troubles and many other unclassified defects.

All workers in the tuberculosis field know how difficult it is to get complete facts regarding the prevalence of this disease and any statement aiming to cover the conditions in a large number of families will be under rather than over the mark. The records of these 590 children show that there was an average of 1.8 per cent. tuberculous persons in the families represented by the children. The above statements give the more serious physical difficulties with which the children were afflicted.

Circumstances relating to the home environment ought to be understood as well. There was an average of 6.15 persons in each family represented by this group. The average number of rooms to the family was a little over four. There was an average of about $2\frac{1}{4}$ persons for each bedroom. Only a few of the children slept alone. Ventilating conditions, hours of retiring, and regularity of meals were unsatisfactory in a large percentage of these families.

Then there is the question of income. The Funds to Parents division of the Juvenile Court of Chicago has within the past few years made a very careful study of budgets in such families as come to the attention of the court. A dietitian is in charge of the department and it has been her business to interview hundreds of such families to ascertain as accurately as she could the amount of income and the expenditures of the family. She studied the items of numerous budgets and in this way arrived at the general type of expenditures and the division of the money between items of food, rent, clothing,

recreation, medical care, etc. The figures dealt largely with families averaging five or six members. The conclusion reached through these studies is that in families of five or six an income of $12.60 per month, per individual in the family, exclusive of rent, is needed to maintain the health and efficiency. This means an income of something like $75 a month. This figure is in substantial agreement with the studies of Chapin and others who have dealt with the question. A number of these studies were made when prices of commodities used in workingmen's families were lower than they are today. Of course it is well known that thousands of families subsist on less than this amount. We are not arguing as to whether this is the correct sum as a minimum standard. We are simply stating the conclusions reached by the Juvenile Court of Chicago. The effort is not merely to maintain existence, but to do their work in the Funds to Parents Department in such a way that there may be an expectation that the children thus cared for will become efficient citizens. It is understood that families aided through the pension department of the Juvenile Court will not be on the books of other organizations, that relief from this source will be sufficient to maintain the living standard. The 598 open air school children in this study represented 371 families. The average income per month per individual in each family for all this group was $7.02. Dividing the families into two groups and placing in one all those whose income was more than $12.60 per member, per month, in one class and all those whose incomes were below $12.60 per individual, per month, we have this result: In 42 of the families, or 11.3 per cent., the average income was $15.70 per individual, per month. In the case of 329 families, or 88.7 per cent., the average income per member, per family, was $5.97. Thus, in a vast majority of cases the income was less than that which the Juvenile Court has established as the necessary sum to maintain health and efficiency and the income for this group was less than half the standard set. This study of income covered the last six months of the year 1913, when industrial conditions were normal in Chicago. During the past year since industrial conditions have been disturbed there has been a noticeable effect in the children. Their clothing is scantier and many of the children show visible effects of privation.

As stated before there were nineteen open air and open window classes represented in this study. Four of the classes were in open air schools, all of them on the roofs of buildings, only one of the four in connection with the public school. None of the plants were originally built for open air school purposes, but were adaptations for open air school purposes. The other fifteen classes were in public school buildings. The children were admitted to the schools on the basis of a careful medical examination. The physicians were paid by the Elizabeth McCormick Memorial Fund. This special arrangement was made in order that consecutive work might be done and that some standard could be arrived at of the amount of time and attention needed by this type of children. The physicians spent an average of about four hours each week at each school. A thorough medical examination was made on admission, another on discharge, and one or two more during the year. The running medical supervision involved visits to the school and attention to any ailment, and making sure that defects were corrected. The physicians find that to make a

thorough examination as deemed necessary, requires from twenty to thirty minutes. The children are stripped to the waist. In each case the parent or the nurse is present during the examination. With two or three exceptions nurses from the Municipal Tuberculosis Sanitarium were in attendance at the schools. They spent an average of a little more than one hour a day on each school. This did not include the nursing service in the home. More than 75 per cent. of the children in these open air schools were known to the Municipal Tuberculosis Sanitarium clinics and were under the care of the sanitarium nurses in the homes. There was an average of about twenty-five children to a teacher and the teachers, as far as possible, were selected because of special interest and evidences of social service spirit and enterprise. Their co-operation with the nurses, the doctors, and social workers interested in these children was most valuable. It meant in each instance that the particular group of children had the benefit of whatever this group could do to promote their welfare. In each instance the children were fed, the food values amounting to between eleven and twelve hundred calories per child per day. The cost was about eleven cents per day, per child. The total cost of feeding, and service, including the doctor was about seventeen cents per day, per child. This figure does not include the teachers' salary. There was a resting period averaging an hour each day, at each school. This in brief indicates the variation in the programme of the open air school.

The great majority of these children were behind grade. An effort was made to arrive at as accurate figures as possible on the school progress of these children prior to their admission to the open air school. The following figures are based on these facts and assumptions:

First, the age and grade of each pupil was taken at the beginning of the school year 1913 when the child entered the open air school.

Second, we assumed that according to usual standards, each child has entered school between six and seven years of age and that he continued in school regularly and that he should have made one grade for each year of school work. On these facts and assumptions, the previous record was as follows:

22 children averaged 0.50 to 1 year to a grade
107 children averaged 1 year to a grade
172 children averaged 1 to 1.50 year to a grade
128 children averaged 1.50 to 2 years to a grade
18 children averaged 2 to 2.50 years to a grade
22 children averaged 2.50 to 3 years to a grade
2 children averaged 3.50 years to a grade
9 children averaged 4 years to a grade
5 children averaged 5 years to a grade
1 child averaged 6 years to a grade
2 children averaged 7 years to a grade

The children in this class made an average gain of 4.95 pounds in the school year of ten months.

The following table shows the gains by age and sex compared with the standards worked out by the Chicago Board of Education by Dr. Emmett Holt and Dr. Boas. There was almost uniform improvement in haemoglobin tests. Improvement also followed from operations for adenoids, tonsils, and correction of teeth and eye defects:

WEIGHTS

Age	No. of Boys	Actual Average Gains per Month	Normal Gains According to		
			Holt	Ch. Bd. Ed.	Boas
7	6	0.37	0.34	0.32	0.35
8	13	0.29	0.47	0.38	0.41
9	21	0.37	0.43	0.43	0.43
10	24	0.41	0.51	0.40	0.48
11	28	0.50	0.45	0.43	0.44
12	18	0.61	0.58	0.59	0.51
13	29	0.70	0.66	0.60	0.65
14	14	0.91	0.85	0.81	0.86
15	9	1.09	0.90	0.91	1.01
16	3	0.52	1.00	0.90	1.13

WEIGHTS

Age	No. of Girls	Actual Average Gains per Month	Normal Gains According to		
			Holt	Ch. Bd. Ed.	Boas
7	4	0.24	0.33	0.36	0.35
8	10	0.45	0.38	0.35	0.40
9	27	0.44	0.36	0.39	0.40
10	20	0.44	0.52	0.44	0.45
11	28	0.55	0.50	0.49	0.55
12	33	0.65	0.86	0.65	0.76
13	21	1.02	0.77	0.80	0.83
14	22	0.85	0.71	0.90	0.80
15	4	0.52	0.65	0.74	0.70

On the academic side, the following table gives some idea of the improvement in school progress:

SCHOOL PROGRESS OF 522 CHILDREN IN CHICAGO OPEN AIR SCHOOLS, SCHOOL YEAR 1913–14

1 child made 3 grades in this school year
12 children made 2 grades this school year
9 children made 1½ grades this school year
387 children made 1 grade in this school year
113 children failed to make 1 grade in this school year

Compared with previous school progress, 409 children made a year's work in a year's time or less in an open air school; whereas in the other table only 129 children made a year's progress in a year's time or less.

In many cities, notably in New York, and in cities in California, they have made great progress in conducting open air classes without the features of food, extra clothing, and medical service and with evident gratifying results. However, we believe for the type of children described above something more than open air conditions is needed if these children are to be restored to health and efficiency. We believe that all schools should approach much more nearly the open air school conditions than they do now, and in many parts of the country there is certainly no reason why all schools should not be open air

schools. In the winter months in colder climates, open air conditions can be much more closely approximated by periodic opening of windows to let in the fresh air. It should not be necessary for children to be sick or abnormal in any way to get their fresh air and hygienic rights.

Let us see that all the children get right conditions; then let us be sure that we give the anaemic, under-nourished child that degree of care and service which will give him a real chance for health and efficiency.

DISCUSSION ON PAPER BY MR. KINGSLEY.

Mrs. Josephine Corliss Preston, Olympia, Wash.: It is in the conjested, and unsanitary quarters of the large cities that the greatest danger of disease lurks. Most of the papers and discussions here today have handled this problem, and have ably set forth plans for overcoming this danger. May I speak on a subject that is much in my mind? May I suggest that even out in the country places we are not free from these same dangers? Our city schools have closer supervision than our country schools, and are better cared for. I find that the city schools need very little attention from the State Department of Education. But the rural school, the little one-roomed country school often has grave problems.

When the speaker was talking about open-air schools I thought how much we needed education on this subject in our rural communities. The school must be the teacher of the home, the children carrying to the latter knowledge at the former. As county superintendent I often came in contact with the health situation out in the open air, free sunshine, and green fields of the country.

I once made a visit to a little country community where we had not been able to find a boarding place for the teacher. We had secured for this position a teacher with a good education. Together we went to the family having the largest house, and the most children of school age. We found the mother an intelligent appearing woman. She urged us in to dinner, and we accepted, although we had carried lunches with us.

The first room, the entrance to the house, was the kitchen. The windows apparently had been nailed down for months, while the stove had not been blackened for several years. Four or five jars of fruit had been opened, and left standing about. The doors and windows were unscreened. I felt some hesitation about entering the next room, and on doing so we found that there was a good fire, and that the windows again were nailed down. We had dinner in the kitchen soon. The table was nicely set, but I could not drink the coffee they offered.

And thus the largest family of children in the district lived. Could I advise the teacher to board there? This is a problem that many a rural teacher has to meet, a boarding place with nailed-down windows, and other unhealthful conditions. Can the outdoor life that the country child is presumed to lead overcome his unsanitary indoor life?

In my early experience I had gone as a representative of the Christian Endeavor Convention to a rural town. My room-mate and I were allotted

to a nice home for entertainment. But when we went to our room at night we found that we could not raise our window. We were forced to get up after a few hours' sleep, and sit on the front porch for air.

We all agree with your speaker who says we must educate 100 per cent. of the boys and girls along this very important line. Educators are doing all they can in the wider use of the school plant. They are attempting to educate in and out of the school room. We are doing, in our state, a great deal of community center work, which is bringing the school and home in closer touch.

We have three classes of school districts: (a) Those containing 10,000 or more persons; these have medical inspection; (b) from 5000 to 10,000, and (c) the little one-roomed school district. There are 1750 of the latter. The county school nurse is our salvation in many cases, especially where the people have not been educated on the necessity of fresh air.

Into these one-roomed schools I feel the urgent need of sending strong teachers. And still, we often are confronted with the unwillingness of such teachers to take these schools. Why? The reasons are many. The seclusion, the lack of social life does not appeal to the average young man or woman; again, in many communities we find every home closing its doors to the teacher, for the farmer's wife feels that she deserves the winter months as a holiday after her strenuous spring and summer's work. We have in Washington 108 teachers' cottages, and where one of these homes is obtainable we find no difficulty in placing there the best teachers.

The cottage, in my mind, is one of the very best ways of educating a community in the proper care of a home. We have in Washington many married men with families, men with much experience, accepting positions in the rural districts because of the Board's furnishing a house for his use. And in such districts we find that the teacher's cottage serves as a model for the women about—the open windows, the screened doors, the carefully dusted furniture, the care of the milk bottles, the well-aired beds, and many, many other little details that go to make up a livable home.

We need a rural social service. By means of the home economics extension work we hope to eliminate such conditions as I have described, and of which I could enumerate many examples. And we have reason to feel that we are doing much to better conditions throughout our rural districts.

The twentieth century demands a new ideal of education that will educate all the children of all the people. Educators must coöperate with the community in order to make a real citizen of the child. One of the greatest problems of education is the rural school.

THE CHILD AND THE COMMUNITY

By Edward O. Otis, M.D.

Boston

THE CONFLICT BETWEEN NATURE AND CIVILIZATION

Nature and civilization often appear to work at cross purposes. Civilization is all the time trying to accomplish the impossible, of having her cake and at the same time eating it. Nature always makes sure that her cake shall be preserved; and she has the advantage of man in that she can *create* as well as *destroy*. She can eat her cake and be sure of getting another. We, in our ignorance, attribute to nature a kindly, beneficent attitude in dealing with life, while, if we look a little under the surface, we discover that in the consummation of her plans she is relentless, wasteful, and cruel; but she accomplishes her purpose without the peradventure of failure unless we interfere with her.

One of the inexorable laws of nature is the maintenance of a type of life which has once come into existence, and to be sure of doing this, she sacrifices ruthlessly many other lives of the same type.

> "So careful of the type she seems,
> So careless of the single life,
> That I considering everywhere
> Her secret meaning in her deeds
> And finding that of fifty seeds
> She often brings but one to bear."

But she never fails to bring that one to bear.

Maeterlinck, in his fascinating story of the "Life of the Bees," tells us how, after the nuptial flight has taken place and the one male out of thousands has been selected by the queen bee to be her mate, and the future generations have been provided for, the hundreds of other disappointed males are mercilessly massacred by the working female bees.

> "And to serve that single issue
> Lest the generations fail,
> The female of the species
> Is more deadly than the male."

Fabre, in his delightful accounts of insect life, tells of similar tragedies in the life history of other insects.

In the higher animal life, when man does not interfere, nature shows the same tenacity of purpose in preserving at all hazards the genus, though she is prodigal of single lives in doing so.

With man, in primitive life, many children are born; families are large. We see this among the families of immigrants in this country at the present time. In the Colonial days of simple living in New England, marriages were early and there were many children. It is the same among the Irish and Russian peasants for example, and generally among people of primitive habits.

Nature, undisturbed by the artificial conditions of so-called higher civilization, appears to follow, with man, her same general plan for the preservation of the race. She provides lives enough, so that, if many are lost, enough will remain to continue and increase the type, the race. We see this process of plentiful supply and great loss in the Chinese race where 60 per cent. of all babies die before reaching the age of two years, and yet enough are left to maintain and increase the stock.

Civilization, with its so-called culture, appears to contravene this law of nature to provide enough lives so that with the loss of many a sufficient number will survive to continue and increase the stock. The higher we go in civilization, the fewer the children. Nature says "quantity;" civilization say "quality"—and loses. We see on every hand the higher types of man decreasing. This is markedly the case at the present time with the old American stock. The old New England families are rapidly dying out. Boston, the ancient center, one may say, of the pure American race, is now 70 per cent. or more foreign. The very means we take to produce the intellectually most fit (higher education, careful and prolonged training, refined environment, and all the arts of a higher civilization) appears to defeat its own purposes, by more or less rapidly rendering that higher type incapable of reproducing itself in sufficiently large numbers to maintain and increase its kind. It is a startling and sad fact, but a fact it seems to be.

It is, then, largely to the families of the newer Americans, to the present lower grades of society, that we must look for the future maintenance of our American white population. Our problem is to contravene nature's law, with regard to man, and see how many of the children in the prolific families of the lower grades of civilization we can save, which nature, in her prodigality, would allow to be destroyed, permitting only the physically fitted to serve. It is a problem for the community, of the highest economic importance as well as a humanitarian one. As Huxley says: "The influence of that which is ethically best, what we call goodness or virtue, is directed not so much to the survival of the fittest as to the fitting of as many as possible to survive."

EUGENIC MARRIAGE LAWS

In the first place, the community is beginning to realize that diseased and physically unfit men and women should not be allowed to marry and produce diseased and physically unfit children. In two States, at least, so-called eugenic-marriage laws have been enacted. Both for the child's sake and for the sake of the community who have to care for the defectives, such a law seems just and reasonable. It is a significant fact bearing upon this point, that the most important causes of infant mortality in New York city, as stated by Dr. Baker, Chief of the Division of Child Hygiene of the Department of Health, in 1913,

are the so-called congenital, inherited diseases, the deaths from which diseases occurring during the first month of life, amount to 35 per cent. of the total deaths under one year.

CARE OF THE INFANT

To ensure a healthy child, pre-and post-natal care and training of the prospective mother is essential, and in many communities this is now done in connection with the lying-in hospitals, or, as in Boston, by the Child Hygiene Department of the Board of Health and other private instrumentalities through visiting nurses who instruct the future mothers in personal hygiene, the general care of pregnancy, and in their own and their babies' care after confinement. The Caroline Rest Training School for Mothers, conducted by the New York Association for Improving the Condition of the Poor, is an excellent example of this kind of welfare work.

All communities now recognize the importance of the preservation of infant life, and in all the large cities, at least, there are many agencies at work to accomplish this, some public and others private. Milk stations, with visiting nurses, infant hospitals and dispensaries, welfare stations, departments of child hygiene of city or state boards of health are some of the instrumentalities. In Boston the Milk and Baby Hygiene Association gives care and exercises supervision over a fifth of the baby population of 20,000 up to one year of age. This it does through milk stations or centers where weekly clinics are held with the mothers, and from which nurses go out and visit the homes regularly. In 1914 there were 2007 deaths of babies under one year of age, or 103 per 1000. Of these, 60 per cent. occurred under three months of age.

Although this is the lowest infant mortality of any city in this country except New York, which was ninety-four per 1000 for the same year, yet it is still too wasteful; for, as someone has recently said, "The occupation of being an infant in Boston is more dangerous than being a soldier in the European war." New Zealand leads the world in its low infant mortality, which is 51 per 1000, and this remarkable result has been accomplished in a large part, says Dr. F. Truby King, through the teaching of mothers pre-natally, post-natally, and later through the milk station.

First and foremost, the mother should be taught the immense importance, for the present and future well being of her child, of breast feeding, and that no kind of artificial feeding can compare with it.

CLEAN MILK

When the baby is weaned, the mother, by ocular demonstration, should be shown how to prepare the milk for that purpose, and afforded opportunity for obtaining clean milk, either raw or pasteurized, and this is now generally possible through the milk stations in the cities. Nothing is of more vital importance in the preservation of the life of babies and young children than the protection of the milk supply, their chief article of food, either by certifying it to be clean, from inspected and tested cows, dairies and wherever milk is sold, or else furnishing it in a pasteurized form.

This duty is now recognized in the sanitary code of most well regulated cities. It has been a long fight in my State of Massachusetts to obtain adequate milk inspection laws. Hardly a legislature passes that the contest is not waged in behalf of clean and safe milk; and it was only a few weeks ago that an efficient milk protection law was finally passed, but unfortunately vetoed by the governor.

The public still needs further education in regard to this surpassing means of conserving infant life. Gastro-intestinal diseases are among the chief causes, as we know, of the high death rate of infants, and they are to a great extent preventable by the use of clean milk. Moreover, the price of safe milk should be within the means of those who can pay but a small sum for it, and it should be furnished free to the very poor, either by the community or through private instrumentality. It must always be insisted upon, however, that during the early months of infant life, no kind of milk, however carefully obtained and modified, can compare with the mother's milk.

After the mother obtains good milk, she should be taught how to properly take care of it at home that it may remain safe, and for this purpose the distribution of free ice in summer is of great aid. "The infant death rate," says Sir Arthur Newsholme, "measures the . . . standards of morals and sanitation of communities;" and one may add that the provision of clean milk by the community is the one most important measure in reducing infant mortality. The community that does it has thereby established its standard of sanitation and its degree of civilization, for as someone has well said, infant mortality is the most sensitive index of the civilization of any community.

FOOD FOR THE CHILD

After the child has graduated from its milk diet, the community has still a duty in seeing that it is provided with proper food. Food inspection laws, so far as they are efficient, and the pure food law, protect to a certain extent the sources of supply. Instructions in the wholesome preparation of food and food values is afforded through domestic science centers, visitors in the homes of the poor, and the teaching of domestic science in the schools. The mother is to be taught that good and nourishing food need not mean expensive food; but she must possess some elementary knowledge of food values and some experience in properly cooking it.

If the child is insufficiently nourished at home on account of ignorance or poverty, school lunches seem to be the obvious remedy, and the child should be encouraged to bring a few pennies for them; for the parents should be made to feel that they are primarily responsible for the well-being of their own children.

It is surprising how much good food value can be obtained for a few cents. Here are some samples lunches served in the High Schools of Boston at cost price, providing about one-fourth of the required daily nourishment for boys and girls of fourteen years:

I.	Baked beans	5 cents
	Graham bread	2 cents
	Cocoa	3 cents
		10 cents

Proteids, grs. 23; fat, grs. 23; carbo-hydrates, grs. 80; calories, 605.

II.	Creamed dried beef	5 cents
	Lettuce sandwich	3 cents
	Milk	3 cents
	Cake	2 cents
		13

Proteids, grs. 24; fat, grs. 28; carbohydrates, grs. 80; calories, 682.

For girls of fourteen years:

I.	Macaroni and cheese	5 cents
	Graham bread and butter	2 cents
	Milk	3 cents
		10

Proteids, grs. 22; fat, grs. 22; carbohydrates, grs. 65; calories, 570.

II.	Creamed eggs	5 cents
	Graham bread and butter	2 cents
	Cocoa	3 cents
	Sponge cake	2 cents
		12 cents

Proteids, grs. 19; fat, grs. 21; carbohydrates, grs. 80; calories, 614.

SCHOOL INSPECTION

When the child arrives at school age, communities quite generally now provide medical inspection and examination of all school children. In Boston such inspection is now very thoroughly administered by competent physicians acting under the Board of Health, assisted by nurses acting under the School Committee. The physician visits the school every day to detect any case needing urgent medical attention. In addition, he is required to make a yearly physical examination, and oftener if the chief of the division shall so order, of every pupil in the school districts, recording his results.

This examination is a very complete one, and a long list of defects and diseases is submitted which the physical examination covers. Examination of the heart, lungs, and spine over the clothing is not accepted. Notice of defects detected is sent to the parents or guardians of defective pupils. School nurses can take children, with the consent of their parents, to the proper dispensaries for treatment or operation, such as removal of adenoids or diseased tonsils.

Thus, from the time the child enters school until it graduates, the community exercises constant supervision over it.

In one of the recent annual reports of the Division of Child Hygiene of the Boston Board of Health, of 118,871 pupils examined, 77,931, or 68 per cent. defects were discovered. The defects originating about the mouth, as defective nasal breathing, hypertrophied tonsils, defective teeth, defective palate, and cervical glands were 100,236, or about 84 per cent. of all defects found. The dental defects were 51,340, or about 66 per cent.

CARE OF CHILDREN'S TEETH

Defective teeth furnish excellent foci for bacterial infection, and the tubercle bacillus among other micro-organisms. "Diseased teeth become human culture tubes with ideal culture media for the germs of disease."

What are the communities doing to protect the teeth of children in more than half of whom they are diseased? In Boston there has recently been completed an unique institution, the like of which does not exist anywhere in the world,—an institution to provide for the dental requirements of the children of the city, the gift of two brothers. It is called the "Forsyth Dental Infirmary for Children." It cost $800,000 and is an imposing marble building, one of the ornamental structures of the city. In addition, an endowment of $2,000,000 is provided for its maintenance. Not only the care of the teeth is included in its functions, but related oral conditions, such as defective palates, adenoids, etc., and general oral hygiene and prophylaxis. Seven hundred and sixty-eight patients can be treated a day, or three treatments annually of 127,000 children. The staff consists of consulting, visiting and permanent dentists, the latter being paid; and physicians. There is a research laboratory, a museum, and a lecture hall. Complete work is done for each patient, and the child is followed up by the school nurse or some other instrumentality until the entire mouth is clean and healthy, including the nose and throat.

When one considers the opportunities for bacterial infection from diseased teeth and unhealthy oral conditions, and the suffering and disease induced in later life from the neglect of the teeth and mouth in childhood, the value of such an institution can hardly be overestimated. Every community should provide some such opportunity for the care of its children's teeth when the parents are unable to do so.

PLAY-GROUNDS

Another insistent demand of child life which the community is coming to recognize is an opportunity for play and recreation, and through municipal or other instrumentalities play-grounds with competent supervision are being established in our large cities. A rather novel plan was recently devised in New York City and St. Louis, where, during certain hours of the day, certain side streets are given over to the children, for play, all traffic on such streets being suspended. Well-ordered play is not only the child's natural way of obtaining physical exercise, but it is in the highest degree educative, inculcating unselfishness, self-control, and the value of team work—lessons so valuable in the competitions and associations of after life. One recalls the saying attributed to Wellington, that he won the battle of Waterloo upon the foot-ball field of Eton.

Anciliary to play-grounds are sand gardens for young children. Many states and municipalities also provide public gymnasiums, baths, and bathing beaches used alike by children and adults.

THE CHILD AND TUBERCULOSIS

Most authorities now believe that the majority of cases of tuberculosis in adult life become infected in childhood. Thus Hamburger has demonstrated that latent tuberculosis is present in 71 per cent. of children from seven to ten years of age. "Our greatest hope for ultimate success in the suppression of tuberculosis," said recently the State Commissioner of Health of Massachusetts, "must lie in the prevention of the development of tuberculosis in the child with a predisposition for, or latent infection of, tuberculosis."

Although open pulmonary tuberculosis is not so frequent in childhood as in adult life, closed tuberculosis is more so, and this form, which is often difficult of diagnosis and is frequently denominated the "pretubercular" stage, may be only suspected by the presence of anemia, malnutrition, and debility. For the majority of such children the open-air schools with intervals for rest and additional nourishment offer the widest opportunity and are generally sufficient. I am happy to say that such schools are rapidly coming into existence throughout the country. For other children a *continuous* open-air life in the country is desirable; and for those in whose home a case of tuberculosis exists the safest way is their removal from the dangerous environment. For this purpose so-called Preventoria have been established, an excellent example of which is the one at Farmingdale, New Jersey, to which children from New York City are sent.

Either by the establishment of such preventoria or by other means the community should protect its children who are exposed to tuberculosis in their homes. It is a general custom now in all tuberculosis dispensaries to submit all the children of a family in which a case of open tuberculosis is present to a careful examination; for Dr. Sachs has shown that in the examination of such children 28 per cent. between the ages of five and ten years and 25 per cent. between ten and fourteen years show evidence of tuberculosis. In 600 patients from the State Sanatoria of Massachusetts there were 966 children under fifteen years of age in their immediate families. Of these 362, or 38 per cent. were examined and the number found to have consumption was $10\frac{1}{2}$ per cent. "The fact stands beyond a doubt," says Professor Nietner, "that in a very large majority of cases the source of infection is the human subject suffering from 'open' tuberculosis, and that infection is effected through the close intercourse resulting from family life within the walls of the home."

The French "League for the Preservation of Children from Tuberculosis" has for its main object the removal of children from homes where they are exposed to infection, and Professor Grancher who established the league says he was moved to do this from the remark of Pasteur in regard to the diseases of the silk worm, that in order to save a race that is threatened by an infectious disease, the best plan is to save the cocoon.

A very interesting experiment was inaugurated several years ago in New York, in the co-called "Home Hospital." A family in which a case of tuberculosis exists is removed entire to this institution where they live under the best hygienic conditions. One of the chief objects this experiment endeavors to accomplish is stated to be: "to prevent the spread of tuberculosis from the

afflicted to well members of the family, particularly to protect the children from infection."

When a child is found to be actively tuberculous, sanatorium treatment should be provided as in the case of adults. This is already done in many communities. The Boston Municipal Consumptive Hospital has a department for children, and so does one of the State Sanatoria of Massachusetts, in both of which school instruction is given when the child's condition permits.

A not infrequent form of tuberculosis in children is that of the glands, bones, joints, spine, and tuberculous peritonitis. There is a difference of opinion as to the cause of infection in these cases, but undoubtedly the bovine tubercle bacillus conveyed in the milk is the causative factor in some of the cases. This is an added reason why every means should be employed to safeguard the milk supply. Children suffering from these forms of tuberculosis should be provided with sanatorium treatment, either in the country, or better, when possible, at the seaside. Rollier's Sanatorium in Leysin, Switzerland, is a striking illustration of the effects of mountain air and heliotherapy; and the Sea-Breeze Sanatorium at Coney Island, New York, illustrates the value of sea-air and sunshine. Not far from this institution the city of New York had acquired a location with 1000 feet of beach, at a cost of $1,250,000, where there is in process of erection a sea-side sanatorium for surgical tuberculosis in children, to accommodate 1000 patients, at a cost of $2,540,000.

CHILD LABOR

Excessive child labor in mill and factory under an unhygienic environment is a potent means of developing the child's latent tuberculosis or rendering him susceptible to a new infection. Laws have been enacted or proposed upon the subject in almost every state, and in many instances the fight for the adequate protection of the child from such exploitation has been a stubborn one. That the growing child should be subjected to the strain of long hours of the grinding monotomy of mill work is manifestly a short-sighted policy as well from an economic point of view as from a humanitarian one. Not long ago a committee of the legislature of one of our states agreed that the eleven-hour day was the proper working period for ten or twelve year old children! What opportunity do children thus treated have to develop into vigorous manhood or womanhood? That the child with its beautiful innocence and trust beyond knowledge, for whom, as someone has said, "the gates of heaven swing inward," should thus be despoiled of its divine heritage of natural child life is a disgrace to our present civilization.

HEALTHY HOMES

The community again has a duty in the housing of its children. A child should have sunlight, fresh air, and cleanliness in its home; for "where the sun enters not, there the doctor comes." Slums with crowded tenements are not inevitable even for the poor, and through boards of health, tenement house inspection, and building laws, it is possible, I believe, to provide whole-

some dwelling places for the children of the wage-earner even in the large cities. Unsanitary, sunless, and illy-ventilated dwellings, where many are crowded into a small space, are favorable conditions for developing the tuberculous child, as abundant evidence has demonstrated.

THE SPIRITUAL DEVELOPMENT OF THE CHILD

The comprehensiveness of my subject permits me to include almost any and every endeavor which it is the province of an intelligent community to make for the conservation of child life. In conclusion, however, I desire to advert to but one other subject which, it seems to me, should have consideration by the community. When we have provided for the physical well-being of the child and its mental training, there is a third and equally important duty of the community, in my opinion, and that is to offer the child means of spiritual development in the years when its imagination is so active, and it lives so much in the realm of fancy. Ideally, the home and the church are the places and the instrumentalities for doing this; but the home often fails in this duty and, in consequence, fails to invoke the aid of the church. If we believe that Christianity is the foundation of character, and that character in the individual establishes the character of the community, and that a community of Christian ideals will best protect and conserve its child life, it is, then, of supreme importance that the community should afford opportunity for its children of religious instruction and training. I can see no other way of doing this in a communal way than somehow through the medium of the public schools. A community imbued with an altruistic, a Christian spirit can be depended upon to care for its children, and needs not to be coerced by law to do certain things needful for their welfare, or deterred by the menace of punishment to refrain from doing things harmful. The spirit of the community will dictate the actions of the community, and if a community believes the words of the Master relative to the child, that "of such is the kingdom of heaven," it will guard and protect the child so that it may grow towards physical and moral perfection, an exampler of the Christ child.

CONCLUSION

The child with its innocence, its faith, its mysticism, nay, its very ignorance, should appeal, if anything can, to the very best instincts of the community, as well as to its selfish interests, for the child of today makes the community of tomorrow. Whatever the physical, mental, and moral education of the child is *now* will be reflected in the character and standards of his day when later he transmutes his present training into action. "It would be a dreadful calamity," said ex-President Roosevelt, "to continue to waste and destroy the resources of the nation, as until a few years ago we were wasting and destroying them, as we still, in certain respects, continue to waste and destroy them. But it would be even a worse calamity, because irremediable, if we wasted and destroyed the manhood and womanhood of the nation. And the only way permanently to conserve the manhood and womanhood is to conserve the childhood."

DISCUSSION ON PAPER BY DR. OTIS

Dr. Thomas D. Tuttle, Seattle: I don't know what we need to talk about public health in Washington for. We have the lowest death rate. We can't help it; the climate does it for us. The Mayor has stated that we have protection in Seattle against tuberculous cows. There are few cities in Washington the size of Seattle that do have protection. Montana has no such large cities but in 1910 there was a regulation passed requiring that all cattle must pass the tuberculin test. To give a few figures: in 1910, there were 278 deaths from enteric diseases among children; 160 being under 1 year; 37 from 1 to 2 years; 28 from 2 to 5 years. In 1911 this dropped to 89 deaths. In 1912, with an increase of 1000 total deaths there were 118 deaths of enteric disease, that is a drop from 278 to 118. In 1913 the matter was put into the hands of a dairy commissioner who was very anxious to have the dairy products increase in quantity. He wanted to advertise the State as a "great dairy State." In 1914 there were 296 deaths from enteric disease. The cattle were more important than the babies. Advertise the dairy but never mind the babies. The same problem arises here. We want to get a law enforcing the tuberculin testing of cattle and we get a law saying that a man can have his cattle tested for tuberculosis if he wants to. The government will do this for him. The consequence is that if a man has good cows he wants them tested. If he has poor cows he does not want to advertise the fact. In future we want all cows tested, for country districts as well as for Seattle. I was raised in a town of 5000, and I know that the small town cannot pass the law. It is up to Seattle, Tacoma and Spokane to see that country people as well are protected against tuberculous cows. We should have inspection every month—more often would be better. In Montana they could cut deaths from enteritis in half. So much for the milk; what about the children? What about your own child? what does it get for breakfast? The child gets up before you do in the morning, and you come down two hours later and get cereal, toast, egg, bacon; does your child get such a nourishing breakfast? You do not know. If you don't get up and see that your child has a good breakfast before it goes to school you can't expect to have a 100 per cent. boy or girl. I think that often our own children do not get what they ought to. The mothers and fathers who are too tired to eat breakfast with their children are too tired to have babies. The question of overwork in the mills is an important one. Some children are put in the mills before a proper age. Parents will often claim the child is past school age in order to put the child to work. We must enforce the registration of children. And in rural districts the teacher can help us. It is a matter of education and we can ask the teacher to find out how many children there are under one year of age and how many of these are registered. The country child is entitled to as much consideration as the city child. In some cases the country child is overworked at home. In one case, where the child was always tired in school it was found that the boy had to get up at five in the morning and feed five cows and two horses and get wood for an eight-roomed house. In the afternoon he had to cut wood. The father on being asked, said he did not know the boy had so much to do.

You can't expect a boy to do the work of a man and be fit to do his school work as well, any more than you can expect a Ford to do the work of a high power car.

Dr. Kober: We owe a great debt of gratitude to those who have discussed these problems. If the public would take such things to heart a great deal of misery would be saved. I saw a picture in London, by the painter, Watts, representing an old man sitting in a chair asleep, with all his implements of his work beside him. Death near him touched him on the shoulder, and in his arm, death had a child, ready to take on the old man's work. If the public could be instructed in their duty, and if the home and schools would follow along these lines, that is how death would come to be depicted.

CLINICAL SECTION

Chairman

W. JARVIS BARLOW, M.D.

Los Angeles

Secretary

R. L. CUNNINGHAM, M.D.

Los Angeles

TRACHEA POSITION

By Gerald B. Webb, M.D., Alexius M. Forster, M.D., and G. Burton Gilbert, M.D.

Colorado Springs, Col.

In the *Archives of Internal Medicine* in December, 1914, we noted in an article on "Pneumothorax," a case where a deviation of the trachea had for 16 years been mistaken by one of us for a cavity at the left lung apex. Palpation of the trachea in the sterno-clavicular notch in this man corroborated the *x*-ray findings so easily, that we have been lead to investigate the tracheal position in a series of 100 cases during the routine physical examination of the chest of patients with pulmonary tuberculosis. The accompanying pictures demonstrate the method of procedure.

By applying the thumb in the manner indicated, the trachea can easily be felt and rolled beneath, in the majority of patients; occasionally a very thick neck will not allow the trachea to be so detected.

We have been surprised to find that in most cases of pulmonary tuberculosis even in the early stages the trachea is deviated to one side or to the other.

Palpation of the position may also be confirmed by auscultation. Loud tubular breathing and loud whispered sounds can be heard in front and often at the back, far to the side on which the trachea is deviated.

Such examination of the trachea position will frequently indicate the lung which will be found most affected with tuberculosis.

In a number of children we have examined, the position of the trachea at the sterno-clavicular notch appears to be central. In normal adults it is also usual to find the position central although exceptions may not be infrequent.

From the frequent deviation we have observed to the affected lung in known tuberculous patients, it is quite possible that deviation in apparently normal people may be a result of an old healed one-sided infection.

The deviation of the heart apex to one side or the other can be observed to corroborate in some cases the deviation of the trachea.

Deviation of the trachea may be due to pleural adhesions together with fibrosis in the lung, or possibly to contraction of the lung roots alone, in which situation tuberculosis is so often considered to have originated.

Marked deviation may suggest adhesions of the pleura on that side, and such adhesions may forewarn us that the application of pneumothorax to that lung in advanced disease may not prove wholly successful.

The movement of the trachea to the side of the healthier lung following the application of pneumothorax, we have found frequently to foretell a successful application of this procedure.

The trachea may be considered possibly as a pendulum which might swing to the side where contraction is taking place.

In the observation of the trachea position in 100 cases of pulmonary tuberculosis of all stages the recognition of the side especially affected proved

Correct	Doubtful	Incorrect
69	19	12

In the observation of the trachea position in 44 advanced cases of the deviation toward the lung most involved, the recognition of the side especially involved proved

Correct	Doubtful	Incorrect
38	5	1

In the observation of the trachea position of 56 early and moderately advanced cases with occasionally the history of pleurisy or the finding of thickened pleurae, the recognition of the side especially affected proved

Correct	Doubtful	Incorrect
32	10	14

It is usual for physicians engaged in examining for tuberculosis to palpate and note the size and consistency of the thyroid gland. Immediately following this examination it is a simple matter to palpate the trachea just below the thyroid isthmus.

We believe from our results to date that the trachea should be palpated and auscultated in the routine examination of our pulmonary patients and the position observed and noted.

We feel that such deviation may be an aid to the early recognition of pulmonary tuberculosis, and also may be of value in deciding the possibility of successful pneumothorax.

In one patient in which a competent *x*-ray observer has made the diagnosis of early aneurysm the deviation of the trachea to the right was corroborated by two of us.

Since the above paper was prepared, Dr. George Mannheimer of New York City has called our attention to a paper by G. Bauer, *Deutsche Medizinische Wochenschrift* No. 9, February 27, 1908, "Slanting of Rima Glottidis and Deviation of Larynx and Trachea in Diagnosis of Pulmonary Tuberculosis."

An abstract of this paper in the *Journal of the American Medical Association*, April 4, 1908, reads as follows:

"Bauer found that the laryngoscope revealed in many cases that the trachea and larynx were dragged to one side by the shrivelling processes in pulmonary tuberculosis. The rima glottidis was found slanting in 27 per cent. of 200 tuberculous patients examined."

This paper is manifestly different to that presented above, although the basis is similar. The method we have presented is at once more convenient and more reliable.

FIG. 1. CASE OF KNOWN DECIDED DEVIATION OF TRACHEA TO LEFT

SEE X-RAY CUT OF SAME PATIENT

O = Absence of tubular breathing. + = Marked tubular breathing

Palpation of Trachea Examiner should be seated in front of patient. Deviation to patient's left best detected by palpation with examiner's left thumb, and vice versa

FIG. 1.—RETRACTION OF THE TRACHEA TO ONE SIDE BY APICAL FIBROSIS.

For emphasis the trachea has been outlined by the radiologist, Dr. L. G. Brown. Fifteen years ago one of us had made a diagnosis of a dry cavity at the left apex. When two years ago the patient again came under observation the unusual position of the trachea was discovered.

DISCUSSION ON PAPER BY DRS. WEBB, FORSTER AND GILBERT

Dr. George Mannheimer, New York: It is not surprising to see the trachea pulled out of position in advanced disease but it is more interesting to know that this can take place in beginning disease. Turban and his collaborators pointed it out many years ago. I have paid more attention to the position of the larynx by inspecting the patient in the recumbent position. Early in the disease I have seen the larynx out of the middle line.

Dr. Ethan A. Gray, Chicago: It occurs to me that the position noted by Dr. Webb is part of the general sign complex in the general organic dislocation in tuberculosis of the lung. We have noticed this with the heart and the condition probably has a cicatricial origin. It is of importance in this connection to note the position of the trachea. I have paid but slight attention to it.

Dr. Webb: I am interested in what Dr. Mannheimer said. In the early part of this work my first thought was Turban's book. I looked through it but found no mention of the subject. Does Dr. Mannheimer refer to some paper?

Dr. Mannheimer: It was published in a small monograph compiled by pupils of Turban.

Dr. Webb: I did not know of the existence of that, but in the ordinary literature, there is nothing concerning this subject. I am proud to have made a rediscovery of Turban's work.

Dr. Gray: Will you again emphasize the bearing of trachea dislocation in early diagnosis?

Dr. Webb: In the case of one boy of 15, of a tuberculous mother, whose condition was run down, there were only found a few fine râles at the apex of the lower left lobe. In that case there was a decided moving of the trachea to the left. I am inclined to think that the more we watch the trachea position the earlier we may possibly detect some cases of pulmonary tuberculosis. In the majority of the cases reported deviation of the trachea to one side or the other correctly foretold the lung which was especially affected.

THE CUTANEOUS TUBERCULIN VACCINATION METHOD

A RELIABLE THERAPEUTIC MEASURE IN THE TREATMENT OF ALL FORMS OF TUBERCULOSIS

By John Ritter, M.D.

Chicago

In the whole realm of applied practical therapeutics, in the extended history on Materia Medica there is not another single instance recorded showing such extreme vicissitudes as is credited to the remedy in question. Very early after the birth of tuberculin in 1890, it was heralded as the great deliverer from the generalized scourge, the white plague, but soon after its inception found by failure and disappointment, to be unreliable and for a time at least relegated into oblivion. Within the last decade or two chiefly through the untiring efforts of earnest and conscientious workers in the field of tuberculin therapy, and who had not lost faith in the ultimate result, tuberculin has once more been placed in the foremost ranks as a remedial agent of great possibilities. In looking over its history, we find that its votaries were many, its detractors equally numerous and the fate of tuberculin remained more or less uncertain until mainly through the painstaking experimentations and careful studies of von Pirquet and his colaborators it was at last placed upon the high pinnacle where it justly belongs. That tuberculin is a remedy of undoubted therapeutic value, we are all agreed, but not a unit as to what constitutes its proper applicability. It was first made manifest principally through the labors of von Pirquet that tuberculin can be fully relied upon as a positive diagnostic remedy, and that by means of its application to the abraded skin specific effects will be brought about on the cuticle of the tuberculous. This was followed by the observations of Calmette that similar effects are produced on any mucous surface, leading to the conjunctival test. Next, Moro showed that alike reactions are possible on the intact cutaneous surface and lastly Mantoux proved that by the intracutaneous use of tuberculin alike results are achieved, this in adults is now most relied upon for its specifically diagnostic results. Whilst in this way the cutaneous reaction of the tuberculin application was chiefly utilized as a diagnostic measure, in other quarters the use of tuberculin as a therapeutic agent, subcutaneously employed, found great favor. The cutaneous reaction following the application of tuberculin for diagnostic purposes was now made the subject of elaborate study by Petruschky, Wolff-Eisner, Sahli, and others to ascertain what specific influence the hyperaemic area accompanying the area of the dermal application might have upon the tuberculous individual and it was soon noticed that this inflammatory area after it had faded away did not have the least deleterious effect upon the economy but that in very many instances a decided improvement was noticeable.

To Carl Spengler belongs the credit of first applying tuberculin by inunction as a therapeutic remedy. This was as early as 1897 and Moro in 1908 suggested that tuberculin ointment be used therapeutically, but it was not, until Petruschky had demonstrated that by the cutaneous inunction method it was possible to treat latent tuberculosis successfully and without any physical disturbance that this mode of tuberculin medication found favor.

There exist still a great diversity of opinion as to how the skin should be denuded for the induction of the cutaneous reaction, how the tuberculin should be applied, pure or in dilution, or if highly concentrated, what effect the application of tuberculin has upon or within the skin, what effect it has upon the tuberculous organism and what it might have upon the growth and destruction of the tubercle bacillus.

In general the technique necessary for the making of tuberculin vaccinations is very simple and Koch's old tuberculin or tuberculin emulsion either pure, highly concentrated, or much diluted is generally employed. v. Wallenstein makes a single scarification with a v. Pirquet scarifier and puts upon it a minute droplet of a very diluted tuberculin solution beginning with $\frac{1}{4}$ or $\frac{1}{2}$ of 1 per cent. or less and reaching as high as 2 per cent. After seven days a second scarification is made and the next higher concentration used. Pappheim makes a small linear scarification upon which a very minute quantity of pure tuberculin is placed. In a few days a second small linear scarification is made near and parallel to the first using as before a very small amount of pure tuberculin. Munch resorts to point vaccination, that is with a needle, the skin is pricked and an infinitesimally small amount of old tuberculin is applied making at the next period two points. He has made as high as nine point vaccinations at one treatment. Professor Sahli who has done an enormous amount of work in this direction used both very diluted and highly concentrated solutions of Koch's old, and occasionally pure tuberculin. He scarifies the sterilized skin with a specially constructed instrument, which consists of 25 circularly placed needles so fastened that by pressing a spring the needles protrude and penetrate the skin at any desired depth. These punctures must not penetrate so deep as to draw blood. Upon this scarified area a single drop of diluted tuberculin is placed and the reaction most carefully studied and from one to ten such scarifications are made at one visit. All tuberculin solutions are so prepared that the next following dilution is only half as concentrated than the next higher and the dosage is gradually increased according to the following scheme $\frac{1}{64}$ per cent., $\frac{1}{32}$ per cent., $\frac{1}{16}$ per cent., $\frac{1}{8}$ per cent., $\frac{1}{4}$ per cent., $\frac{1}{2}$ per cent., 1 per cent., 2 per cent., 4 per cent., 8 per cent., 16 per cent., 32 per cent., 64 per cent. and pure tuberculin.

The Ponndorf method to a modification of which I have adhered in this work is as follows: As in all operations causing ever so little traumatism of the skin, asepsis should be strictly enforced. The vaccination may be applied on any part of the body but the upper arm offers the most suitable place. The area intended for scarification is thoroughly cleansed with green soap and water, if the skin is very clean, sponging and rubbing with alcohol will usually suffice. Now by means of a von Pirquet scarifier, sterile needle or lance from 15 to 30 or more linear and parallel scarifications are made from 1 to 2 mm. apart

and from 40 to 50 in length. These scarifications must not penetrate to the deeper layers of the skin, just sufficient to notice a slight linear abrasion and should not be deeper than would be necessary to do a typical Mantoux. Now upon this so prepared field a drop or two of Koch's old tuberculin, undiluted, or pure bacillary emulsion, is placed and with the middle finger of the right hand protected by a sterile rubber finger cot, the tuberculin is gently rubbed into the abraded skin till it has disappeared. When the field is dry it should be covered with sterile gauze for 12 or 24 hours then removed and the scarified area very closely observed.

Noting the very favorable and flattering results reported by Professor Ponndorf in his elaborate monogram on the treatment of the tuberculous by the cutaneous vaccination method, I began in May, 1914, to apply this form of tuberculin medication on individuals suffering from various forms of tuberculosis and I wish to report before this earnest body of tuberculosis workers, my observations, though still incomplete, for consideration.

The total number of patients treated by this cutaneous vaccination method during the year was 91 and of this number 43 received treatment at the Rush Medical College Ambulatorium of the Municipal Tuberculosis Sanitarium; 8 children were treated at the Home for Destitute and Cripple Children; 26 at the Children's Memorial Hospital and 14 were private patients. In all, 419 scarifications were made and 631 drops of Koch's pure old tuberculin used.

It is very important at the onset to know when and how often to repeat the vaccination and from observations I believe that most patients will do best if all re-vaccinations are made at regular intervals of about 21 days, giving at least from 7 to 10 more treatments. Of the 91 patients treated by the method, 29 were pulmonary tuberculous, mainly first and second stage cases. In 2, at the time not very active third stage cases, the treatment was very early discontinued owing to its depressing effect. Eight of the thirteen glandular cases were post-operative and in these the favorable influence of the treatment was very noticeable. The 18 cases of tuberculosis of the knee or hip, knee and hip and hip and spine all were in children ranging in age from $3\frac{1}{2}$ to 11, many with sinus openings, about one-half were operated upon and were under observation for more than 6 months, receiving from 7 to 9 treatments and a decided improvement in the general condition as well as in the tuberculous process was evident, but by far the best result of the treatment was observed in the 13 children suffering from Pott's disease of the spine, 8 of which were post-operative cases, a successful Albee operation having been performed to correct the spinal deformity, the remaining 5 were under palliative care upon a Brelfeld splint or in a plaster cast. In one of the Albee cases the treatment was discontinued, owing to an infection in the bone graft. This patient, a girl of 7, has since died from generalized tuberculosis. Four of my cases were tuberculosis of the wrist or ankle bone, all post-operative and two of these, mechanics, are back at work. Another developed an active pulmonary disease, and since ad exitus. The three cases of tuberculosis of the pleura are under observation and up to the present, nothing definite can be reported. The three cases of multiple tuberculous abscesses mainly about the costo-sternal articulations are most interesting. The records of one, a young woman aged

30, shows a gain in weight of 21 pounds (88 pounds at the first visit, 8 months after 109); during that time she received 9 cutaneous vaccination treatments applying 17 drops of tuberculin. This patient and another doing equally as well are now, in addition to the tuberculin treatment, receiving large doses of tincture of iodine as high as 60 drops three times a day. Two cases of tuberculous peritonitis are still under observation and both are doing well. In this category are two cases of extremely rare tuberculous disease namely that of the pubic bone, one of these is especially interesting. This patient was treated for more than two years for a discharging Bartholin's gland, establishing the undoubted tuberculous nature, a cold abscess, she was placed in a hospital and after a thorough curetting of the diseased bone was put on the vaccination treatment. She has received in all 6 treatments within 7 months using 11 drops of tuberculin, recovery is complete. Two cases of renal tuberculosis are receiving treatment, some improvement is noticeable. Lupus vulgaris, one case, in a girl of 17 is of much interest. Reared in the country as a farm hand she noticed that at the age of 8 a slow developing and progressing skin lesion on the back of the right hand. This apparently harmless skin lesion has in 9 years spread over the backs of both hands, forearm, part of the upper arms, the greater part of the nose and left cheek. She has received in all 7 vaccinations using 13 drops of tuberculin, covering a period of 7 months and her weight during that time has increased from $107\frac{1}{2}$ to 116 pounds. She is still under observation. The one case of psoas abscess has not yet received sufficient medication to deserve further mention.

In all these 91 treated cases a diagnosis of tuberculous lesion was made positive before instituting the tuberculin vaccination medication. Everything was done according to modern methods to demonstrate the tuberculous nature. In each case a careful study of the history was made, the pulse rate and temperature curve repeatedly observed, repeated examinations of the sputum and urine noted, the various diagnostic tuberculin tests, v. Pirquet, Moro, and Mantoux applied, Wassermann made if necessary, etc.

Koch's old tuberculin, pure and undiluted, was used in all vaccinations and the beginning dose in every case was one drop carefully placed upon the scarified skin by means of a medicine dropper. Each drop as it was removed from the vial containing a c.c. of old tuberculin was carefully noted and tabulated and in this way by using throughout the whole period, the same dropper, and of course with a definite lumen, it was readily ascertained that each c.c. yielded approximately 45 drops and as the initial application always consisted of one drop this gave an equivalent of 33 mgm. to a dose. In the second vaccination and all subsequent ones, particularly in adults, usually 2 drops or 66 mgm. were used, in children the dosage of one drop was generally adhered to. In a few instances as high as three drops equal to 100 mgm. or $\frac{1}{10}$ c.c., were used without the least untoward effect. In many instances almost immediately following the application of the tuberculin to the abraded skin, a slight redness and elevation of the scarified area was noticeable. Many patients complained of a slight burning sensation; however, most individuals made no further complaint until after a lapse of from 12, 24 or 48 hours when the gauze bandage had been removed when the sensation of slight pain or burning feeling

was spoken of. Systemic disturbances, unless the scarification were made too deep, were very seldom encountered. A few complained of a slight pain in the arm, in the axilla or chest; also, mention was occasionally made that the appetite was not so good as formerly, but most patients suffered no inconvenience whatever; a rise in temperature and an accelerated pulse were also infrequent. On the whole, considering the large amounts of tuberculin applied by this method, the result of the vaccination treatment are most satisfactory and encouraging. The reaction is usually at its height the third or fourth day when it begins to fade away and any systemic disturbance which may be in evidence such as rise in temperature, acceleration of the pulse are in general never very high or alarming; and observation has also been made that after repeated re-vaccinations at regular intervals, that each following vaccination after the fourth or fifth is less vigorous than the previous one and that if these vaccinations will continue that a time will arrive when no reaction will accompany the tuberculin application. This in a sense undoubtedly proves the immunizing effect of the treatment.

Children suffering from post-operative Pott's disease, bone and joint tuberculosis with open sinuses, show in many instances a slight rise in temperature on the fourth day accompanied by a slightly accelerated pulse and the reaction is usually marked by a raised erythematous area which is often times more marked after the second vaccination, the erythema extending a few cm. beyond the scarification.

In the use of tuberculin by the cutaneous vaccination method, it is desirable to produce a vigorous skin reaction at the place of application with more or less induration and that a so-called inflammatory halo be distinctly noticeable extending more or less beyond the area of scarification, at the same time, no generalized or systemic disturbance is to be manifest, because, no unchanged tuberculin will be absorbed and enter the organism. This leads to the production of large quantities of antibodies, to active immunization and the larger this inflammatory area the greater is the antibody formation.

If the skin is hyposensitive and no definite cutaneous reaction follows the primary application of tuberculin an attempt should be made, by re-vaccination after a given time, upon the same skin area, for it may be possible to bring about at the second vaccination a definite and distinct reaction upon this skin area possessing now anaphalactic or allergic properties.

If in a positively tuberculous individual either incipient or not far advanced, the denudation of the cuticle over a sterilized area is made in such a manner that the blood vessel remain intact so that no immediate absorption of artificial tuberculin can take place one may not fear any generalized or systemic reaction even if large quantities of tuberculin are applied. When we consider that frequently very alarming symptoms have been witnessed after the use of milligram and even less than millimilligram doses subcutaneously administered, and that by this method a dose of 100 fold greater is used it only remains naturally to reason that in the former the injection of a milligram of tuberculin finds its way directly into the organism as a toxin into the tissues and is absorbed into the circulation and acting as a foreign albumen calls forth an anaphalactic reaction, whilst in the latter, the artificial tuberculin enters the

body, not as a toxin, as a tuberculo-toxin, but as a chemically combined tuberculin with a modified or reduced body tuberculin for which it possesses great affinity and being now detoxinized it enters the circulation, producing no deleterious effect upon the tuberculously infected organism.

In the M. M. W., April 7, 1914, appears a valuable contribution from the study of Dr. Ponndorf Sanitary physician at the Variola Institute at Weimar on the supposed cure of the various forms of tuberculosis by means of intradermal or cutaneous tuberculin vaccination. His observations relative to immunity in small pox vaccination established certain noticeable facts, namely that the skin and mucous membrane of every individual offer the most suitable protection to the body against mechanical insults of all kinds, example of which may be daily observed by the external influence of heat and cold, but that a still greater protection, however, is offered to the economy after infection from all forms of micro-organisms and that the elaborated specific toxins as a result of primary bacillary infection and growth are taken up by the epithelial layers of the skin and mucous membranes and are there with more or less rapidity reduced, changed or dissociated into simpler or less toxic substances and that in a given infected individual, a subsequent infection from the same organism or their toxins there is now produced in these chemically changed cell contents or modified toxins with the now entering endotoxins of the bacillary bodies new chemical combinations which are manifested in the production of an inflammatory reaction in the skin and mucous membrane at the site of the application and which as antibodies in the infected individual act as protecting agents against a re-infection from the same organism or at least greatly modifies another infection. Three facts are of great importance in this connection. First, that the progress of cowpox vaccination in an organism is much influenced if to the vaccine matter dried and finely powdered epithelial cells from a successfully vaccinated animal have been added. This can be clearly demonstrated by the rapidity of development and size of the postule on vaccinated calves where under normal conditions a period of incubation lasting usually more than two days is entirely lost, the postule formation beginning almost immediately after this mode of vaccination and second, that by means of the dermal application of avirulent endotoxins one is able to produce in a successfully immunized individual a definite cutaneous reaction which shows not only the degree of immunization but also approximately the time which has elapsed since this successful vaccination was accomplished. For instance, if an endotoxin re-vaccination is resorted to very soon after the primary vaccination has been perfected, no skin reaction is noticeable but if this re-vaccination is repeated at more protracted and longer intervals, one will observe a definite reaction in proportion to these intervals; at first possibly find only slight redness, somewhat later a slight papule, still later a typical vaccination pustule leaving distinct skin lesion as in a primary vaccination; and third, that from this, these important facts remain that repeating these cutaneous endotoxin vaccinations the specific toxins modified in the epithelial cells of the skin and mucous membranes and which are always in a state of chemical change can be more rapidly eliminated, that the vaccine immunity was of shorter duration and that the animal was again sensitized for a virulent re-vaccination.

Stimulated by the elaborate experimentations and results of von Pirquet, Moro, Petruschky and others he was induced to make analogous observations on the skin of tuberculously infected animals and he was able to demonstrate in these animals, although in a somewhat modified form a similar condition as in variola vaccinated animals and that with the beginning of the areola the freeing of the body from both viris and toxin began. Continuing along these lines he was surprised to find that by rubbing into the ear of a tuberculously infected rabbit, the endotoxin of dried, dead, and powdered tubercle bacilli, that he produced a very large hyperaemic area and on investigating for the cause of this cutaneous area and its effect from a therapeutic standpoint, he soon noticed, though an artificially produced area, that greater quantities of antibodies, simpler and with much less work, could be produced than is possible to produce in the diseased organism by any serum or other vaccine method.

The tuberculous individual has at all times at his disposal deposited in the epithelial cells of the skin and in the mucous membrane as well, modified changed or dissociated tuberculin and it is only necessary to add to these toxic cells unchanged toxins of the tubercle bacillus to produce antibodies which find ready entrance into the lymph current. The chemical affinity existing between the modified tuberculin contained in the body cells derived from the natural bacillary development in the economy and the added artificial tuberculin produced outside of the body is so great that almost an immediate combination seems to be brought about when in intimate contact and that none of this artificial tuberculin can enter the blood stream in an unaltered or unchanged condition. This is most important because it has repeatedly been shown that the subcutaneous injection of even the minutest quantity of tuberculin in an hypersensitive individual is often very detrimental to and hastened the tuberculous process and if in spite of all, minute doses of tuberculin subcutaneously given may give good results, it is because the epithelial cells were in a condition to supply sufficient changed or modified tuberculin to chemically combine or bind the added tuberculin permitting none to enter as unchanged tuberculin into the lymph channels.

That the tuberculously free organism does not react to tuberculin bespeaks its specific characterizations and that is because the artificial tuberculin when applied to the skin of a never infected individual does not find in it the modified or changed systemically produced tuberculin with which it can enter into chemical union, hence no reaction and again the toxically tuberculous also does not react to the applied tuberculin because the tuberculin in the epithelial cells of this class of tuberculous is not changed, the artificially produced and the applied being identical, no chemical change will take place, hence again no reaction.

v. Pirquet expressed the view that the incorporation of a minute amount of tuberculin does not influence the organism either favorably or unfavorably and yet, out of 700 cutaneous reactions, he observed three times a very sharp rise in temperature undoubtedly attributable to the use of tuberculin. Wolff-Eisner and Moro both observed in various cases a great rise in temperature following the application of tuberculin and they express the opinion that after repeated cutaneous reactions, the tuberculous may be much benefited.

Professor Sahli very emphatically says that in the use of tuberculin for therapeutic purposes, it must not be incorporated into the economy by the injection or subcutaneous method, but rather by the cutaneous scarification or still better by the cutaneous vaccination principle, in use of the remedy, for diagnostic purposes, like a v. Pirquet, allowing the applied artificial tuberculin to be held in the skin, the cuticle acting like a filter, producing thereby a local reaction at the point of entry due to the lysinized tuberculin or amboceptors in the layer of the skin combining with the added tuberculin.

Max Dubi states that a tuberculin concentration of definite strength if applied to a previously scarified area may produce only a moderate reaction but if upon this so vaccinated area a second or re-vaccination is done and the same strength tuberculin is now applied, it may be followed by a very severe local reaction and at the same time a most pronounced systemic reaction is produced and this is brought about in the local process in combination with an over-production of lysinized tuberculin. From our present knowledge however, it is more reasonable to assume that upon a re-vaccinated area the epithelial layers of the skin are in a state of cell relaxation at least for a time, containing less modified, changed or altered body tuberculin and the added artificial tuberculin having less chemical affinity for the naturally modified tuberculin may now be absorbed and all the manifestations of tuberculotoxin disturbances be noticeable.

As it is wll known that specific medication, so-called, cannot cure tuberculosis, it is not intended to advocate that by means of the cutaneous tuberculin vaccination a positive method for the relief of manifest tuberculosis has been found. By its means I maintain that a greater increase of body resistance can be brought about than is possible to bring about by any other method of tuberculin application or medication. For obvious reasons it is particularly available in that large class of latent tuberculosis, while they are still closed on account of its easy and harmless applicability. It assists very materially in the production of the body's defense agencies, increasing the power of the body's resistance.

The following tables are a summary of the 91 cases treated by the vaccination method during the year, giving the history number or initials of the place or home where the treatment was given, the patient name or initial, time of first and last vaccination, number of vaccinations given, the amount of tuberculin applied, the temperature, pulse, respiration, and weight at first and last visit, examination of the sputum, etc.

PULMONARY

Case No	Name	Age	Diagnosis	First Vacc	Last Vacc
3451	A., M., 112 N. Green St.	65	Pul. mod. adv.	9–26–14	4–21–15
3598	Z., S., 639 W. 19th St.	33	Pul. tb. mod. adv.	10–21–14	5– 8–15
2945	K., Mrs. Eliz., 1410 Van Buren St.	31	Pul. tb. incip.	9–16–14	4–14–15
3340	B., Mr. E. J. 3406 Flournoy St.	34	Pul. mod. adv.	6– 4–14	7– 2–14
3053	V., Miss G., 2526 Park Av.	25	Pul. tb. incip.	6–18–14	2–22–15
3441	Z., Frank, 216 Carlyle Av.	45	Pul. tb. mod. adv.	10–24–14	4–10–15
3700	McG., Jas., 3129 W. Polk St.	24	Pul. tb. mod. adv.	1– 2–15	?
3761	S., L., 226 S. Aberdeen St.	35	Pul. tb. incip.	1–20–15	?
3879	C., Mrs. C., 2224 Emerson Av.	41	Pul. incip.	4–17–15	?
3840	S., Mrs. V., 510 N. Lincoln St.	36	Pul. tb. incip.	3–24–15	5– 7–15
3900	K., Mr. F., 2024 Warren Av.	37	Pul. incip.	3–15–15	4–17–15
3587	R., Miss A., 8941 Wallace St.	19	Pul. tb. incip.	2–20–15	?
3724	B., Miss B., 200 N. California Av.	32	Pul. tb. incip.	1–23–15	5–17–15
3701	N., Mrs. Edw., 3532 Melrose St.	30	Pul. tb. mod. adv.	12–16–14	?
3500	W., Miss J., 1810 W. 12th St.	38	Pul. tb. incip.	10–24–14	5– 8–15
3867	N., P., 2611 Superior St.	28	Pul. mod. adv.	2–24–15	?
3878	P., C., 1616 Austin Av.	28	Pul. tb. incip.	3–24–15	4–17–15
3205	O., Mr. Chas., 3639 Hoyne Ave.	32	Pul. tb. mod. adv.	5–25–14	12–16–14
3671	T., Mrs. Susie, 1406 W. Harrison St.	21	Pul. tb. mod. adv.	12–23–14	?
3712	M., Mrs. Martha, 1241 W. Adams St.	27	Pul. incip.	1–13–15	?
3511	V., Mr. Henry, 115 N. Ada St.	32	Pul. mod. adv.	11– 4–14	2– 6–15
3961	R., O., West Chicago, Ill.	26	Pul. III	12– 9–14	3– 3–15
3641	J., Mrs. Marg., 814 W. Congress St.	26	Pul. tb. incip	1–13–15	?
82	S., Mr. Stephen, 1035 Irving Park	24	Pul. tb. incip.	10–28–14	12–31–14
H. C.	R , Louis, 613 S. Hermitage Av.	25	Pul. mod. adv.	6–11–14	1–30–15
H. C.	S., Clarence	....	Pul. mod. adv.	9–18–14	.....
H. C.	M., Mrs., 1844 W. Monroe St.	....	Pul. adv. III	10–20–14	.....
3749	B., A., 1500 Congress St.	29	Pul. tbc. II	1–16–15	.....
3961	V., A., 808 S. Loomis St.	27	Pul. tbc. I	5– 8–15	.....

Tuberculosis of Metacarpal and

C. M. H.	McShea, John, Children's Memorial Hospital	7	Tb. phalanx (left foot)	10–15–14	.....
H. C.	T., F., 2407 Trumbull Av.	24	Tb. metacarpal (left hand)	6–13–14	9–16–14
H. C.	K., V.., 2304 N. Mango St.	22	Tb. metacarpal	7– 3–14	8–26–14
H. C.	S., F., Wash. Blvd. Hosp.	39	Tb. metacarpal (right foot)	12–15–14	1– 8–15

CASES

No. of Vaccs.	No. of Drops	First Visit				Last Visit				Sputums			Remarks
		T	P	R	W	T	P	R	W.				
9	17	90.6	96	24	129	99.8	100	28	135	7–22–14 Positive	11–11–14 Positive	3–24–15 Positive	Still taking the treatment
10	19	98.6	88	26	147½	98.4	80	22	153	10– 4–14 Positive	10– 4–14 Positive	11– 4–14 Positive	Taking the treatment
8	16	99.8	108	24	86¼	99	92	22	100	8–23–13 Negative	7–11–14 Negative	.....	Continued the treatment
2	3	99	88	20	127½	.....	.....	.....	.....	.....	.....	.....	Did not return
4	5	98.6	88	18	129	99	96	20	125	1– 8–13 Positive	.....	.....	At sanitarium
7	13	97.8	96	28	140	98.6	96	22	135¾	7–22–14 Negative	8– 6–14 Positive	10–14–14 Positive	Is under observation
1	1	100	100	28	124¼	99	120	32	116	12– 5–14 Positive	.....	.....	Did not return
1	1	98.6	98	26	163½	99.2	96	24	168½	1–16–15 Positive	.....	.....	Did not return
1	1	98.6	72	24	143	99	78	18	142½	3– 3–15 Negative	.....	.....	Did not return
3	5	99	112	28	98½	99	88	22	98½	2–25–15 Negative	.....	.....	.....
2	3	98	90	20	136½	99.3	96	24	141½	3–13–15 Positive	.....	.....	Did not return
1	1	99	100	24	127	99	100	18	138¼	.....	.....	.....	Did not return
6	11	99	84	20	115	98.6	92	20	117½	.....	.....	.....	Is taking the treatment
1	1	96.4	80	26	92	98	98	26	91	12–16–14 Positive	.....	.....	Did not return
7	13	98	88	24	108½	98.6	80	20	113	8–19–14 Negative	9– 5–14 Negative	.....	Continues the treatment
1	1	97	86	22	121	.....	.....	.....	.....	3–24–15 Positive	.....	.....	Did not return
2	3	98.2	104	16	134	98.6	80	20	130	1– 4–15 Negative	.....	.....	.....
9	17	98	104	24	144	97.6	80	22	132½	12–23–14 Positive	.....	.....	Did not return for treatment
1	1	102	124	34	109	102.6	124	28	100	12– 8–14 Positive	.....	.....	Went to sanitarium
1	1	98.8	110	30	93	98	116	24	104	1–16–15 Negative	.....	.....	Went to sanitarium
5	9	98.8	82	24	120½	98	80	18	129	12–19–14 Negative	.....	.....	Did not return
3	4	96	100	22	138	99.8	120	28	124¼	12– 5–14 Positive	.....	.....	Very advanced form now
1	1	99.8	106	26	108	100	90	22	110¾	11–11–14 Positive	.....	.....	.....
2	3	97.4	108	....	106¼	98	100	....	129⅛	1–13–15 Positive	.....	.....	At sanitarium
8	15	99.4	102	....	174	99.4	82	....	179½	Positive	.....	.....	Now at sanitarium
1	1	100	104	....	.....	.....	.....	.....	.....	Positive	.....	.....	Sent to sanitarium
1	1	99.6	120	....	.....	98.2	108	....	.....	Positive	.....	.....	Died
1	1	99	98	....	133	.....	.....	.....	133	Negative	.....	.....	Did not return
1	1	98.4	80	....	134	.....	.....	.....	134	2. Neg.	.....	.....	.....

Phalangeal Bones (Wrist and Ankle)

1	1	99.6	100	20	.....	.....	....	....	.....	.....	.....	.....	Left the hospital
3	5	n.	86	....	.....	n.	96	....	.....	.....	.....	.....	Did not return
3	5	n.	100	....	.....	99.2	96	....	.....	.....	.....	.....	Developed pul. tb. Died
2	3	98	76	....	.....	97.2	80	....	.....	.....	.....	.....	Did not return

GLANDULAR

Case No.	Name	Age	Diagnosis	First Vacc.	Last Vacc.
1253	N., Miss H., 2845 California Av.	11	Gl. tb.	6–13–14	5–30–15
3388	L., Miss M., 1245 Rockwell St.	18	Gl. tb.	6–17–14	2–17–15
3632	D., S., 2148 W. Erie St.	9	Gl. tb.	11– 4–14	.....
3346	A., Johannes, 5119 Strong St.	17	Gl. tb.	10–17–14	4–24–15
2982	P., George, 3111 Howard St.	11	Gl. tb.	8–12–14	9–19–14
2917	C., Mrs. N., Gray's Lake, Ill.	29	Gl. tb.	5–29–14	4–19–15
2392	B., Mrs. Marg., 2315 Green St.	38	Gl. tb.	5–29–14	5–19–15
3319	R., Mrs. Olga, 2334 Sawyer Av.	24	Gl. tb.	9–26–14	1–19–15
H. C.	B. Peter, Pullman, Ill.	43	Gl. tb.	6–14–14	10– 4–14
H. C.	McC., Miss Anna, 3218 Carroll Av.	21	Gl. tb.	8–24–14	11–18–14
H. C.	McC., Miss Briget, 2738 W. Polk St.	20	Gl. tb.	10–10–14	5–22–15
H. C.	J., Miss R., 642 N. Park Av.	19	Gl. tb	10–19–14	2–22–15
H. C.	Dr. Carlton, Washington Boulevard Hosp.	....	Gl. tb.	9– 2–14	3– 2–15

Tuberculosis of Hip,

C. C. H.	Rogland, Roy, Crippled Children's Home	5½	Tb. knee	8–11–14	3–28–15
C. C. H.	Yelowsky, Yuston, Crippled Children's Home	6	Tb. knee and hip	8–11–14	10–16–14
C. C. H.	Shellenberger, Eleanor, Crippled Children's Home	7½	Tb. hip	12–13–14	3–28–15
C. C. H.	O'Connell, Michael, Crippled Children's Home	4½	Tb. hip and knee	8–11–14	10–16–14
C. M. H.	Goldstein, Jacob, Children's Memorial Hospital	6½	Tb. hip and spine	9– 1–14	3– 7–15
C. M. H.	Sundholm, Mildred, Children's Memorial Hospital	7	Tb. hip	9– 1–14	3– 7–15
C. M. H.	Roceio, Tony, Children's Memorial Hospital	8	Tb. knee	9– 1–14	.....
C. M. H.	Kraus, John, Children's Memorial Hospital	3½	Tb. hip	9– 1–14	.....
C. M. H.	Pomezkoroski, Jno., Children's Memorial Hospital	6	Tb. knee	10–15–14	.....
C. M. H.	Pendhagyn, Florence, Children's Memorial Hospital	4	Tb. hip	10–15–14	1–10–15
C. M. H.	Skoedopole, Jennie, Children's Memorial Hospital	10	Tb. hip	10–15–14	3– 7–15
C. M. H.	Payne, Harry, Children's Memorial Hospital	7	Tb. hip	10–15–14	3– 7–15
C. M. H.	McGriff, Wilbur, Children's Memorial Hospital	4	Tb. hip	10–15–14	3– 7–15
C. M. H.	Hayes, Harry, Children's Memorial Hospital	6	Tb. hip and spine	11–12–14	3– 7–15
C. M. H.	Hogan, Annie, Children's Memorial Hospital	11	Tb. hip	2– 7–15	3– 7–15
C. M. H.	Rzapko, Edward, Children's Memorial Hospital	5	Tb. hip and spine	2– 7–15	3– 7–15
C. M. H.	Hasse, Rosie, Children's Memorial Hospital	6	Tb. hip	12–20–14	.....
C. M. H.	Kush, Margaret, Children's Memorial Hospital	9	Tb. knee	11–12–14	.....

Psoas

C. M. H.	Ayers, Rex, Children's Memorial Hospital	....	Psoas abscess	11–12–14	2– 7–15

TUBERCULOSIS

No. of Vaccs.	No. of Drops	First Visit				Last Visit				Sputums	Remarks
		T	P	R	W	T	P	R	W		
8	15	99.4	84	.....	60	98.6	76	.....	116	.....	Private Ofc.
10	19	98.8	80	20	120	98.4	80	28	118¾	8-19-14 Negative	Now in sanatarium
1	1	100	128	26	57½	99.8	106	22	63½	0	Hypersensitive, slow in healing
7	13	98.8	86	24	107¾	99.4	84	24	114	0	Is still treating
2	3	98.2	84	22	60	99	94	26	69¾	11-29-13 Negative	In good health
10	19	99.4	92	22	145¾	98.8	88	20	150	0	Takes an occasional treatment
9	17	99	100	24	119¼	99.2	92	16	118	0	Is still being treated
5	11	99.2	84	24	112	98.2	78	20	114	0	Did not return
5	8	99	82	.....	179	99	76	.....	?	.....	Did not return
5	9	97.6	78	.....	?	97	90	.....	?	.....	Did not return
7	13	98.8	70	.....	128½	99.2	82	.....	143	.....	Still under observation
5	9	99.4	110	.....	114¾	98.6	110	.....	.....	.....	Did not return
7	13	.....	.....	.....	?	.....	.....	.....	?	.....	Much improved, went South

Knee and Spine

9	10	99.4	140	36	.....	99	98	23	.....	.....	Condition much improved
4	4	98.6	120	22	.....	99.2	94	20	.....	.....	Improved
3	3	100	116	24	.....	.....	.....	.....	.....	.....	Is doing very fine
4	4	98.2	92	22	.....	99.4	.....	.....	.....	.....	Left the home
9	9	99.8	100	24	.....	99.8	86	20	33¾	.....	Much improved
9	9	99	104	24	.....	99.6	120	30	.....	.....	Much improved
3	3	98.6	86	20	.....	.....	.....	.....	.....	.....	.....
4	4	99.0	98	24	.....	.....	.....	.....	.....	.....	.....
2	2	99.4	88	26	.....	.....	.....	.....	35½	.....	.....
5	5	99.2	90	23	.....	.....	.....	.....	.....	.....	.....
7	7	98.8	98	20	.....	.....	.....	.....	.....	.....	Condition very good
7	7	98.2	92	20	.....	.....	.....	.....	36	.....	Slightly improved
6	6	99.2	88	22	.....	.....	.....	.....	28½	.....	Has gained, is doing well
6	6	99.6	106	26	.....	.....	.....	.....	35½	.....	Is somewhat improved
2	2	98.6	100	20	.....	.....	.....	.....	.....	.....	In fair condition
2	2	100.6	108	20	.....	.....	.....	.....	35	.....	Is improving
1	1	98	90	.....	.....	.....	.....	.....	.....	.....	Went home
1	1	99	88	22	.....	.....	.....	.....	.....	.....	Went home

Abscess

4	4	99.4	100	22	.....	101.6	112	32	.....	.....	.....

POTTS'

Case No.	Name	Age	Diagnosis	First Vacc.	Last Vacc.
3756	Conroy, Ellen, 1035 S. Seeley Av.	8	Potts' disease	9–28–14	4–17–15
C. C. H.	Taylor, Wm., 3854 Gresham	10 (albee)	Potts' disease	9–15–14	1–18–15
C. C. H.	Soweski, Josie, Crippled Children's Home	7 (albee)	Potts' disease	8–11–14	12–13–14
C. C. H.	Wallace, Mabel, Crippled Children's Home	11 (albee)	Potts' disease	9– 4–14	10–16–14
C. C. H.	Porter, O'Neil, Crippled Children's Home	4 (albee)	Potts' disease	8–11–14	1–17–15
C. M. H.	Swanson, Carl, Children's Memorial Hospital	8 (albee)	Potts' disease	9– 1–14	3– 7–15
C. M. H.	Petrik, George, Children's Memorial Hospital	2½	Potts' disease	9– 1–14	3– 7–15
C. M. H.	Kramer, Chas., Children's Memorial Hospital	3 (albee)	Potts' disease	9– 1–14	3– 7–15
C. M. H.	Watling, Ethel, Children's Memorial Hospital	12	Potts' disease	10–15–14	.....
C. M. H.	Wasch, Max, Children's Memorial Hospital	3 (albee)	Potts' disease	10–15–14	2– 7–15
C. M. H.	K., Frank, Children's Memorial Hospital	.....	Potts' disease	10–15–14	.....
C. M. H.	Katabacz, Arona, Children's Memorial Hospital	3	Potts' disease	12–20–14	1–24–15
C. M. H.	Ganna, Lois, Children's Memorial Hospital	3 (albee)	Potts' disease	12–20–14	2– 7–15

Tuberculosis

3305	A., Albert, 4945 Ferdinand St.	34	Tb. kidney	8–12–14	.....
3642	J., N., 3456 N. Hoyne Av.	24	Tb. kidney	11– 7–14	5–15–15

Tuberculosis of

3501	F., J., 2714 W. Division St.	21	Tb. peritoneum	8–29–14	4–10–15
3518	M., R., 1123 Grand Av.	30	Tb. peritoneum	9– 9–14	1–16–15

Tuberculous

3185	D., J., 316 W. Oak St.	30	Tb. absc.	7–22–14	4– 2–15
H. C.	B., A., 2507 W. Monroe St.	.....	Tb. absc.	1–12–15	5–13–15
C. M. H.	Kannagan, Jno., Children's Memorial Hospital	10	Tb. absc.	9– 1–14	3– 7–15

Tuberculosis of

H. C.	S., J., Wheaton, Ill.	23	Bone tb.	6– 3–14	1– 4–15
C. M. H.	Klass, Sidney, Children's Memorial Hospital	6	Bone tb.	12–20–14	2– 7–15

Pleurisy

H. C.	G., L., 4121 W. 25th St.	21	Pleurisy	.....	.....
3484	K., L., 4854 W. 22d Pl.	20	Pleurisy	9–23–14	1–27–15
3534	P., C., 1152 W. Congress St.	45	Pleurisy	10–31–14	.....

Lupus

2658	H., A., 7[illegible] Wash. Blvd.	16	Lupus vulgaris	9–26–14	4–28–15

DISEASE

No. of Vacc.	No. of Drops	First Visit				Last Visit				Sputums	Remarks
		T	P	R	W	T	P	R	W		
8	12	99	100	....	46½	99	108	....	48½	.....	Returned to hospital
5	5	99	150	.....	.....	99	98	23	.....	.....	Died suddenly
6	6	100	130	30	.....	100.4	138	28	.....	.....	Exitus
3	3	98.6	90	22	.....	99.6	92	24	.....	.....	Sent to County Convalescent Home
7	7	99	120	24	.....	101.6	104	32	.....	.....	Doing poorly
9	9	99.6	100	24	.....	100.2	116	18	40¼	.....	Doing fairly
8	8	98.4	100	24	.....	.....	.....	.....	.....	.....	.....
8	8	99	108	26	.....	.....	.....	.....	25½	.....	Much improved
5	5	99	96	26	.....	.....	.....	.....	.....	.....	Much improved
5	5	99.8	106	22	.....	.....	.....	.....	23	.....	Much improved
1	1	99	88	20	.....	.....	.....	.....	.....	.....	.....
2	2	100	80	.....	.....	99.6	120	....	.....	.....	.....
3	3	101	120	....	.....	.....	.....	.....	.....	.....	.....

of the Kidney

6	11	98.8	116	24	109¼	98.8	110	111	.....	.....	Did not return
10	19	98.8	80	20	105	98.2	94	20	118½	Not expectorating	Still under observation

the Peritoneum

7	13	99	88	24	126	98.6	86	24	128½	Negative	Is now on tincture iodine
3	6	97	100	24	101	98.2	98	20	99¼	2 Negative	Did not return

Abscesses (Multiple)

9	18	101.4	92	26	88	98	100	22	109	Negative	Still under treatment
3	5	99.6	124	.....	.....	99.5	118	.....	.....	Negative	Much improved
9	9	99.8	108	24	.....	99.8	120	26	31¼	.....	Very much improved

the Pubic Bone

6	11	98.6	104	....	.....	97.5	96	26	.....	.....	Process healed
3	3	100	80	....	.....	.....	.....	....	47¼	.....	Is improving

1	1	99.6	100	....	.....	.....	.....	.....	.....	.....	Did not return
7	13	100	116	36	113¾	98	92	22	126½	8–5 –14. Postive 1–9– 15 tb. present 10–21–14. Neg.	Pt. in M. T. San
1	1	4	90	24	138⅛	98.8	102	24	143	8–29–14. Neg.	Did not return

7	13	98.8	96	24	107½	99.2	84	22	116	Not expectorating	Much improved

DISCUSSION ON PAPER BY DR. RITTER

Dr. Charles C. Browning, Los Angeles: I had hoped that some one else would open the discussion on this paper; it is too valuable to pass without comment. I have not had any experience with this particular method of the administration of tuberculin. I am thoroughly convinced of the value of tuberculin as a therapeutic agent in tuberculosis. I am also alive to its disadvantages. Any improvement in technique which will aid us in securing the best results while eliminating the undesirable features, is more than welcome. I shall certainly apply this method, because it is founded on what I believe to be a true principle. I will go further than the doctor has gone. I believe it is a useful therapeutic agent in early cases as well as advanced cases. Some persons cannot discontinue their work or change their mode of life. In these early cases, tuberculin is sufficient to give the individual the amount of added resistance which enables them to begin recovery. I feel that in this particular class of cases this will have an advantage, because the doctor says it reduces the liability of systemic reaction. It is safe to try. I have the highest regard for Professor Solley, but when a man says that tuberculin is never to be used in the tissues, he is going to an extreme. We have all, including reports from Professor Solley, had excellent results with this method, but we are continuously looking for something better.

Dr. O. W. McMichael, Chicago: I am very much interested in what Dr. Ritter has developed. I have no experience in his particular method and so am not prepared to discuss his results. It seems to me that when you are administering tuberculin you should keep in mind what you are trying to produce. There are times when an individual is sensitive to tuberculin and when he is not. Particularly is this noticeable in children. Some can take extremely large doses. Others are particularly sensitive. I have found the von Pirquet reaction a very good guide to the sensitiveness of the individual. The size of the dose can be regulated by the study of the skin reaction. It seems to me in Dr. Ritter's method of applying tuberculin it is rather a difficult matter to establish just how much tuberculin is absorbed. More or less of the tuberculin is wiped off on the clothing. It is not completely absorbed. Dr. Ritter's results seem to have been particularly encouraging.

Dr. George Mannheimer, New York: It is very interesting to see what tuberculin therapy is coming to. It has been given in various ways, hypodermically, by mouth, by rectum, through the trachea; and lately by way of the skin. Dr. Ritter's claims are very modest. It seems to be very successful in latent tuberculosis. It may prevent the latent stage from becoming active, the lymphoid stage from becoming generalized, so that metastases do not occur. The idea of this therapy is to heighten resistance. Every normal individual has a certain amount of resistance and under ordinary conditions that is sufficient. If accidents like trauma or infectious diseases supervene, the disease is likely to get headway. The advantage of this method is that we can make the labile resistance stable. Petruschki uses the tuberculin and bacillus emulsion mixture diluted with glycerin and changes the points of inunction to avoid skin irritation. He does not tell us what antigene

he uses. He claims to have rid a little fishing village on the Baltic of tuberculosis. This is a most convenient method from the patient's point of view. It is harmless. If we don't claim more than Dr. Ritter, we can safely follow this method.

Dr. Ethan A. Gray, Chicago: There is one point upon which I would ask the doctor to inform me, and that is how does he give his massive doses of iodine. I have never been able to go above 20 drops, and then I have had trouble. I should like to know how Dr. Ritter gives 50 or 60 drops with success. Vaccination can be used on tuberculous glands, making a pirquet in the area drained by the infected glands. The method is very satisfactory; assuming that we have diseased glands of the neck in the posterior triangle, and put a von Pirquet, 100 per cent T. O. behind the ear. A very lively reaction will often occur. The disappearance of the areola is the best guide to repetition. Many of the cases treated are relapses after operation. Tuberculin must then be put on both sides of the scar which has severed and separated the lymphatic system. I have seen enormous enlarged glands of the neck, pushing out the ear, disappear after 4 to 6 months treatment, but the pulmonary condition remained unaffected.

Dr. Thomas H. Hay, Stevens Point, Wis.: I have never made use of the percutaneous method. I should like to ask Dr. Ritter if he has noticed marked differences in the different areas of the skin. There is considerable difference in different lots of tuberculin in the production of the local reaction. Dr. Ritter's method is one which controls absorption of tuberculin and also limits the local reaction more thoroughly to the skin, from which point we get out antibodies, so that we should get better results.

Dr. Ritter: In looking over the proceedings for the past 4 or 5 years, we find that tuberculin is applied in some instances with greatest effect in extremely high dilution. I was the first to administer tuberculin in concentrations. The first case of advanced tuberculosis in which I used pure tuberculin got no reaction on his body at all. I then tried it in a case of gland tuberculosis with a reaction on the arm, no rise of temperature and no systemic disturbance, and after that I began the use of tuberculin in large doses, in 490 scarifications using over 500 drops of Koch's O. T. I have used occasionally American tuberculin but I don't like its results. As far as different areas are concerned, I have not observed any difference in results in either right arm or left. I have used glycerin tuberculin preparations on the skin without dilution. Petruschki has had good results with this. As regards tincture of iodine, I am now using large doses, 90 drops and more in post-operative cases, without any disturbance. I give it in milk, increasing one drop every meal. I have had no gastric disturbance or irritation of the mucous membrane of the stomach. I believe that in post-operative cases of peritonitis or pleurisy you can get very good results. I don't believe that we have something entirely new in the percutaneous method, but I am sure that we can get better results with larger doses of tuberculin than with small ones and without any ill effect. I would like that some of the physicians here try the method and report the results at our next meeting next year.

A STUDY OF KROENIG'S ISTHMUS IN PULMONARY TUBERCULOSIS

By Walter C. Klotz, M.D.

Los Angeles, Calif.

The object of the following study was to determine, if possible what clinical significance there might be in the disparity of physical signs at the apices as bearing on tuberculous lesions. In studying frozen sections of human subjects, Fetterolf and Norris[1] found a distinct difference in the size and shape of the right pulmonary apex as compared with the left. They concluded that this difference was due to the encroachment of the large blood vessels of the neck and the relation of the trachea. Moreover they found this difference in right and left-handed individuals, and independent of any pathological changes in the lungs. It seemed of interest therefore to study the physical signs at the apices in the presence of actual tuberculous lesions, keeping these anatomical differences in mind, for the reason that more or less diagnostic significance has been ascribed to disparity of physical signs, especially the apical percussion fields. The literature of the subject is probably so familiar to all tuberculosis workers that the citing of references would be superfluous. It may be of interest however to recall that Bonney[2] cites instances where the apical percussion field on the right side was distinctly contracted without any discoverable tuberculous changes on that side. It might be pertinent also in passing to refer to Kroenig's[3] later views as to nasal obstruction and consequent "Collapse Induration" as a cause of altered physical signs at the apex.

The material for this investigation consisted of 124 cases admitted to The Barlow Sanatorium since May, 1913, and 19 controls, with four exceptions pupil nurses who had been examined carefully as a matter of routine when entering upon their service at the Sanatorium, and who were physically well presumably on admission to the training school of a general hospital, where moreover they had been able to carry out their duties for a period of one year or more, without impairment of health. They cannot of course be considered absolute controls, as a previous infection with tubercle bacilli cannot be excluded positively. Those, however, in whom a tuberculous implantation seemed at all probable were not considered.

In making these studies the determination of Kroenig's Isthmus was selected as the index of any existing disparity, because the differences could not only be recorded graphically, but the actual figures in centimeters noted. In this way the results obtained in a series of cases could be tabulated more readily, for the sake of comparison. Preference was given Kroenig's method as compared with Goldscheider's on account of less difficult technic and consequent greater probability of accurate results. The measurements in the clinical cases were all made at the time of the first physical examination after

admission. The area of transmitted pulmonary resonance was outlined with skin pencil as far as the clavicle in front and the spine of the scapula behind. These outlines were transcribed as accurately as possible on the case charts, and the actual measurements of the isthmus noted at the same time. In those cases where on account of considerable retraction of the apex the isthmus was obliterated and the area of pulmonary resonance did not reach the border of the Trapezius muscle, the isthmus was noted as O regardless of the highest point at which pulmonary resonance could be noted.

For convenience in studying the results, the cases were divided into groups. The first group comprises all cases with tubercle bacilli in the sputum, in addi-

MEASUREMENTS IN 118 CASES OF PULMONARY TUBERCULOSIS

TABULATION SHOWING RELATION OF KROENIG'S ISTHMUS

Group I: T. B. in sputum, signs of activity.

		Isthmus narrower on the right side	*Isthmus narrower on the left side*	*Same on both sides*
Right sided lesions	24	24	0	0
Left sided lesions	7	5	2	0
Bilateral lesions	52	51	1	0
Total	83	80	3	0

Group II: T. B. absent, but signs of active lesion.

		Isthmus narrower on the right side	*Isthmus narrower on the left side*	*Same on both sides*
Right sided lesions	15	15	0	0
Left sided lesions	10	8	2	0
Bilateral lesions	10	10	0	0
Total	35	33	2	0

Group III: T. B. absent, no signs of activity, but symptoms of active diseases.

		Isthmus narrower on the right side	*Isthmus narrower on the left side*	*Same on both sides*
Right sided lesions	4	3	1	0
Left sided lesions	0	..	..	..
Bilateral lesions	2	2	0	0
Total	6	5	1	0

Group IV: Controls: Normal cases with no signs or symptoms and no T. B.

Isthmus narrower on the right side	*Isthmus narrower on the left side*	*Same on both sides*
16	1	2

NOTE: Among the 19 controls 16 showed narrowing of the isthmus on the right side, the difference varying from 0.5 cm. to 4 cm.

tion to signs of active lesion and clinical symptoms of disease. The second group includes those cases in which tubercle bacilli had not been found in the sputum at any time, but in which there were clinical symptoms and signs of active lesion, (persistent moist rales). The third group comprises those cases in which there were no signs of active process and no tubercle bacilli, but in which there were definite symptoms of tuberculous disease and the physical signs showed definite changes in the lungs. The fourth group includes the 19 controls, in whom there were no signs or symptoms of tuberculosis and who did not give any history of tuberculosis in the past.

Taking up the results obtained for the first group of 83 cases with tubercle bacilli in the sputum, we find 24 with predominant right sided lesions, in all of which the isthmus was narrower on the right side. In 3 cases there was complete retraction of the apex. In 15 cases with predominant left sided lesions the isthmus was narrower on the left side in only two, and in these two there was complete retraction of the apex on the left side, on account of extensive cavity formation and contraction. The remaining 52 cases of this group showed lesions distributed fairly evenly over both sides. Only one showed a narrower isthmus on the left side; here due to an old fibrous lesion.

Among 35 cases without bacilli, but with signs of active lesion there were 15 with predominant right sided lesions in all of which the isthmus was narrower on the right side; 10 with left sided lesions in which two showed narrowing on the left side and 10 with bilateral lesions in all of which again the isthmus was narrower on the right side.

Of the 6 cases in the third group: cases without bacilli and without signs of activity, there were 4 predominant right sided lesions in three of which the isthmus was narrower on the right, and in one on the left side. In two cases of this group with bilateral lesions the isthmus was narrower on the right side.

Summing up these results for the three groups of clinical cases we find that out of 124 cases, the isthmus was narrower on the right side in 118 or 95.1 per cent. Among the 19 controls we find a narrower isthmus on the right side in 16 or 84.2 per cent. The above findings must be interpreted carefully on account of the disproportion of clinical cases and controls. As 4 of the cases in this series died at the sanatorium and came to autopsy it will be of interest to compare the clinical findings with the anatomical changes and to study the relation of both to the disparity of the apical fields. In order to bring out these features more distinctly the autopsy findings in these four cases are considered more in detail.

Case I.—613. Isthmus right, 2.5 cm., left, 5 cm. Clinical diagnosis: disseminated general miliary tuberculosis, chronic tuberculosis and cavity right apex. Necropsy: anatomical diagnosis; disseminated miliary tuberculosis both lungs; chronic tuberculosis both upper lobes. Left apex: fibrous nodule, retraction and puckering of pleura, adhesions. Disseminated miliary tuberculosis upper and lower lobes. Right lung: fibrocaseous consolidation apex, with medium sized multilocular cavity, adhesions and thickening of pleura, disseminated miliary tuberculosis rest of upper, middle and lower lobes.

Case II.—641. Isthmus right side 4 cm., left 7 cm. Clinical diagnosis: fibrocaseous tuberculosis both lungs, extensive fibrosis, thickening and adhesions of pleura. Cavity right apex, cavity or recent intense consolidation left upper lobe. Necropsy: anatomical diagnosis: fibrocaseous tuberculosis involving nearly all of both lungs. Left lung: partial consolidation of upper lobe with three areas of marked consolidation, no cavities or adhesions. Right lung. Dense adhesions, fibrocaseous consolidation of upper lobe with medium sized multilocular cavity at apex, marked infiltration of lower lobe; fresh area of consolidation and two small cavities.

Case III.—648. Isthmus right side 0, left 5 cm. Clinical diagnosis: fibrocaseous tuberculosis right upper lobe with cavity, infiltration right lower lobe;

infiltration and partial consolidation left upper lobe. Necropsy: anatomical diagnosis. Left lung; fibrocaseous consolidation apex, small cavity, old adhesions; lower lobe, infiltration and small fibrous nodule near apex. Right lung: extensive old dense adhesions, markedly thickened pleura, fibrocaseous consolidation upper lobe, marked induration apex, medium sized cavity showing fibrous wall and trabeculation; fibrocaseous consolidation, middle and apex of lower lobe, with small cavity lower lobe.

Case IV.—696. Isthmus right side O, left 4.5 cm. Clinical diagnosis: fibrocaseous tuberculosis both lungs, cavities both apices. Necropsy: anatomical diagnosis: fibrocaseous tuberculosis involving nearly all of both lungs. Left apex large multilocular cavity, adhesions and thickening of pleura. Right apex: large multilocular cavity, adhesions and thickening of pleura.

A study of the autopsy findings shows that in the two cases in which the isthmus on the right side was O, and 4.5 and 5 cm. on the left side, there were old lesions on both sides, however the lesions were more extensive on the right side. In the other cases the differences in measurements of the apices were less marked, and in one of these curiously the lesions at the left apex were more recent. In all the four cases there were distinct lesions at the left apex without a corresponding narrowing of Kroenig's isthmus on this side.

The results in both the clinical cases and autopsies would justify the belief therefore that in most instances the differences in measurements of the apical percussion fields could not be due to tuberculous changes alone. It would be difficult to explain the almost constant narrowing of the isthmus on the right side regardless of the site of more extensive lesions. It may be granted that implantation does occur more frequently on the right side at or near the apex. Some of the causes for this predisposition have been cleared up by Bacmeister's 4 experiments upon animals. It is only reasonable to assume therefore that some changes at the right apex are the result of former tuberculous implantations, the lesions having become healed, and no longer active at the time of observation. If this were true however in all cases, we ought to meet with a corresponding change on the left side more frequently than we do, especially in the presence of more extensive or predominant lesions on the left side. It is the exception to find lesions limited to the right side in active cases, (in our tabulations the cases were classified only as to predominant lesions). Infection usually extends to the left side quite early in the course of the disease and greater portions of the left lung may become involved, while the process on the right side may become quiescent or fully arrested. Under such circumstances it would only be reasonable to expect more frequent and more marked changes at the left apex, assuming that such changes do result secondarily from tuberculous inflammation. It is to be noted also that the disparity of the isthmus was no more frequent, relatively, in the open active cases than it was in the inactive, and only slightly more frequent than in the controls. It was only in those cases with very extensive lesions and marked contraction of the lung that there was a corresponding narrrowing of Kroenig's isthmus on the same side.

In view of our findings the conclusion might be drawn; that unless the disparity of the apical percussion field, expressed in terms of Kroenig's isthmus

is very marked, it does not necessarily point toward tuberculosis of the corresponding side. Such a disparity is also of much less significance on the right side than on the left. The disparity is also of greater significance where there is complete obliteration of Kroenig's isthmus, but under such circumstances the diagnosis does not present any difficulties. In most instances the disparity of the apical percussion field is simply due to anatomical changes, not related to tuberculosis.

LITERATURE

1. Fetterolf and Norris: 7th Annual Report, Phipps Institute, University of Penna.; 1913, sect. xvi, p. 29.
2. Bonney: "Tuberculosis," New York, 1906, p. 284.
3. Kroenig: Deutsche Klinik, xl, p. 634.
4. Bacmeister: Die Enstehung der Menschlichen Phthise, Berlin, 1914.

DISCUSSION ON PAPER BY DR. KLOTZ

Dr. John Ritter, Chicago: The paper is a very interesting to one who has taught physical diagnosis for many years and I believe that this point ought to be emphasized more in the training of our younger men. Kroenig's sign is much ignored in our text books, or alluded to too briefly. Most men use heavy percussion for Kroenig's sign but one must not percuss too hard. You must hear hardly any sound, and the resistance in Kroenig's sign is one of the typical points in early diagnosis, a very mild percussion is necessary. I have often demonstrated to students the border line where there is no lung tissue and where lung tissue begins.

Dr. E. A. Pierce, Portland, Ore.: I am particularly pleased to hear this paper. I had always supposed that the primary lesion was usually on the right side. This demonstration has given support to that theory. In conversation with Dr. Waters of New York he emphasized this point. This early evidence should be watched for very carefully. The active lesion is not always on the right side; it may be at the left apex, some previous lesion probably having occurred at the right apex.

THE DIAGNOSIS OF INTRA-THORACIC TUBERCULOSIS IN CHILDREN

By W. J. Dobbie, M.D.,
Weston, Ont.

It is not the purpose of this paper to advocate any new method of diagnosing tubercle, nor is there any claim that either the material or the method of presentation are in any way original. It is merely an endeavor to throw into relief the difficulties presenting themselves in connection with the diagnosis of intrathoracic tuberculosis in children, as well as to emphasize to as great an extent as possible the paramount importance of the detection of this condition in early life. That the difficulties are more serious than any to be met in the diagnosis of similar conditions in adult life, serves but to render the need for their solution the more urgent, while the prominence which has been given in recent years to childhood as the period in which tuberculosis is most frequently contracted, directs attention to the subject as one demanding consideration.

Considerable evidence has been collected concerning tuberculosis in children. At autopsy there is a rise in frequency from 15 per cent. in the first year to 70 per cent. in the twelfth. In those dying from other causes, tuberculosis is found as a complication in 2 per cent. of the cases in the first year and in over 50 per cent. in the twelfth; and though there are discrepancies between the post-mortem and the clinical records, the statistics which are available are such as to warrant the conclusion that both in infancy and childhood the disease is decidedly prevalent.

There may be noted also certain prominent features at different ages. A child subjected to a first infection of a severe type rapidly succumbs with acute or generalized tuberculosis. But if the first infection be not fatal nor of a severe type, a certain degree of immunity against a fresh infection is developed. In the case of a subsequent infection the disease is likely to be of a chronic type. Likewise in an infant, though the lymphatic system has relatively the greatest power of resistance, its power of reaction is not as great as in an older child. The result is that an infection which an infant could not withstand, would, in an older child, be shut off from the rest of the body, and there would be produced either a glandular involvement diagnosable as such, or an occult disease say of the bronchial glands. At the school age, again, we have other parts such as bones and joints resisting the disease, and still later, say at puberty, we find typical lesions in the lungs as well.

We have then, four classes:

(1) Severe infection in infancy (1–2 years) with fatal result.

(2) Mild infection in infancy (1–2 years) with a developed immunity.

(3) Severe infection in an older child (2–4 years) with glandular involvement or bone and joint disease (4–6 years).

(4) A first or second infection at puberty of the pulmonary type.

In the other forms of tuberculosis in children as distinct from those that may be described as intra-thoracic, there is usually some symptom or sign to which the attention of the parent is drawn, so that the child is brought under the care of a physician. In the intra-thoracic type, however, the process is so insidious both in its onset and progress, that little warning is given, and the process may have advanced to a serious extent before the child is known to be ill at all.

In all of the manifestations of the disease in childhood, certain features are presented which are quite distinct from those to be found in connection with the same process in adults, but in none, perhaps, is the deviation from the usual adult type more marked than in those to be found within the thorax.

In this anatomical location, tuberculous lesions may be found in

(1) The bronchial and mediastinal glands.
(2) The lungs.
(3) The pleurae.
(4) The mediastinum.
(5) The pericardium and heart.
(6) The thoracic duct.

These are, of course, not all of equal importance. Some of them cannot be recognized clinically either at all or with certainty, and though of interest when found, need not now be considered as of importance. In this class may be included:

1. *Tuberculosis of the Pericardium* which may occur as a part of a generalized miliary tuberculosis, or may result as an extension from the pleura, the peritoneum, the mediastinum, or the bronchial glands.

This condition usually, of course, appears in older persons and is stated to be not common in childhood. It is one which is very likely to be overlooked clinically and even in those cases in which an effusion is detected, the tubercle is rarely discovered, and the identity of the infection cannot be determined.

2. *Tubercular Myocarditis* which is more often found in the young. The difficulties, however, in the way of a differential diagnosis are so great that certainty cannot often be made to replace suspicion.

3. *Tubercular Endocarditis*, which appears most often in young children as a part of miliary tuberculosis. The question may be raised as to whether or not it is possible to make a definite diagnosis.

The other forms, however, viz:

1. Tuberculosis of the pleura.
2. Tuberculosis of the mediastinum.
3. Tuberculosis of the lungs.
4. Tuberculosis of the bronchial glands,

are of much importance, and it is to these that attention should be most directed. There is no need and it is not the intention to recite in detail the characteristic symptoms of these conditions. They are not always easy to detect, nor can they always with certainty be differentiated. By the physi-

cian who has given special attention to tuberculosis, they are of course, not likely to be overlooked, but for the busy general practitioner, it would appear to be extremely desirable that the main manifestations of tubercle as it presents itself in these forms should be emphasized with persistence.

Tuberculosis of the Mediastinum is fairly common. It may be an extension from the pleura, the pericardium, the bronchial glands, the spinal column, or the ribs. Abscesses are usually the result and these may rupture into the pleural cavity, the great veins or onto the surface. If there is no abscess, symptoms may be wanting or the only physical sign may be a pleuro-pericardial friction rub. When abscess is present there may be pain, dyspnoea, and dysphagia, as well as fever, and rapid pulse. There may also be signs of pressure, such as venous obstruction, displacement of organs, or dullness over the sternum.

It is evident that there is little in this condition to lead to an early diagnosis. What would there be aside from a general condition of ill health, which would prompt a parent to seek the advice of the family physician? At best it would only be when the more alarming symptoms presented themselves that advice would be sought. Nor is there much in many cases to guide the physician. In the absence of abscess formation there is practically nothing. Yet the health of the child is below normal and the case is one of a type that should not be dismissed without most careful investigation.

Tuberculosis of the Pleura in childhood is not common. When associated with pulmonary tuberculosis it is usually dry pleurisy, and leads to adhesions of the lobes to one another, and to the parietal layer. When there is effusion it may be serous, sero-purulent, purulent, or hemorrhagic, but in children, while it is more frequently purulent than it is in the case of adults, it is less frequently tuberculous. The symptoms are not characteristic. There may be fever, dyspnoea, pain and when fluid is detected, it may be tuberculous if lymphocytes preponderate or if it is hemorrhagic or if cultural investigation proves negative.

In such cases if there be pain or distress the family physician will surely be consulted. Should the physical signs suggest the presence of fluid the diagnosis of the underlying cause should not be omitted, and animal inoculation may produce results when other methods fail. The difficulties in the way of a definite diagnosis, however, seem to be very great. Yet even when the signs are vague or the results of the examination uncertain, is it not advisable to have a mental reservation as to tubercle being present and to treat accordingly? Can it be said that this is usually done? Does the child subsequently receive the attention such a case requires?

Bronchial Glands. Tuberculosis of the bronchial glands is one of the most common forms of the disease in childhood. At post-mortem examinations on tuberculous children, the bronchial glands are almost always found to be involved, and while there are differences of opinion both as to the source and avenue of the infection, it must be conceded that these glands are the site of important lesions at an early period. Up to about the age of twelve years, this form of the disease takes the same rank in the child as does the apical lesion in the adult. Although those on the right side are more frequently and

as a rule more extensively involved, it is not uncommon for those on both sides to be affected, and although the discovery in later life of old calcified scars would seem to indicate that it is possible for some lesions to become quiescent, it must be admitted that in childhood, calcification is rare.

Although the early recognition of the condition is important, neither the symptoms nor physical signs are at all characteristic, but an indefinite and progressive condition of ill health, leading to lassitude, emaciation, anaemia, always calls the attention of the parent to the case and the family physician is consulted. And what are the important signs by which he may be guided? Especially suspicious is a troublesome dry cough, worse at night, and even occurring in paroxysms, suggesting whooping cough. There may be slight fever, usually irregular. The results of physical examination are very uncertain and not at all characteristic.

Inspection will help if the child is anaemic or below the usual standard of health, but it will fail to indicate much that points to intra-thoracic tuberculosis. There may at once be revealed fullness of the superficial veins, a sign of much importance in children. Those usually enlarged are those over the chest wall, the anterior jugulars, and those over the temples, pointing probably to obstruction of the azygos vein.

Palpation, is, if anything, of less value than inspection, though some claim to be able in some cases to detect some glandular thickening by deep palpation in the episternal notch.

Percussion on the other hand, is often of value. By it may be detected circumscribed dullness at the side of the manubrium, or dullness at the side of the third to the fifth dorsal vertebrae.

Numerous other signs have been described as having been detected and as being of value, but concerning all these, it may be said that while they may or may not be found in any particular cases, he who relies on them to aid in diagnosis should not allow his search for them to obscure the general picture upon which alone can much reliance be placed for the diagnosis of this condition.

Why was the child brought to the physician? Possibly for some very ordinary symptom noticed by the parent, such as lassitude, loss of appetite, or a little hacking cough. And how many times in such cases is a thorough examination given with tubercle in the mind of the physician? It is seldom possible to exclude tubercle entirely in such cases, but unless the condition present can be explained as being due to some other cause, and it responds to appropriate treatment, the case cannot be dismissed, though certain diagnosis may be extremely difficult. This appears to be the point on which emphasis should be laid, viz: Exhaustive examination with tubercle in mind for all cases in which symptoms of ill health are not definitely diagnosed as being due to some other cause.

The Lungs. As regards tuberculosis of the lungs in children, it would appear that under the age of 4 years there is a tendency for all the lesions to be miliary or caseous, and it is not until after this period, that they begin to resemble those found in adult life.

We may, therefore, classify the cases into:

1. Acute miliary tuberculosis.

2. Acute caseous tuberculosis.
3. Chronic fibro-caseous tuberculosis.

Acute Miliary Tuberculosis is, of course, most frequently found in childhood, but is responsible for only about 10 per cent. of the deaths from tuberculosis in children under 14 years of age. While this type of disease is usually generalized, cases may be met in which it is confined almost altogether to the lungs. Usually in such cases there has been a breaking down of a caseous focus, perhaps in a bronchial gland, perhaps in the lung itself. Infants are most frequently affected, and both the onset and the course are usually rapid.

Beginning as a broncho-pneumonia with cough, malaise, and fever, respiratory distress soon becomes prominent. Dyspnoea and cyanosis are marked, and though there may be no other unusual signs, the seriousness of the condition is apparent.

The diagnosis of such cases is not difficult, but how often is the idea of tubercule associated with that of broncho-pneumonia? If it is, all the "contact" cases will be investigated, whereas if the diagnosis be merely that of broncho-pneumonia, suspicion is allayed. The history, the associations, the severity of the symptoms as compared with the physical signs must all be considered.

It is well, too, not to be deceived by a more gradual onset. For two or three weeks there may be no other symptoms but a temperature reaching 101°–103°F., and a few scattered râles. There is not much cough, and little wasting. The main difficulty is to account for the temperature, and this difficulty should be the danger signal. Soon the symptoms may become more marked and more varied. The fever may reach 105° F., and pulse may be 180 and respiration 50–60. Wasting and exhaustion supervene, and the prognosis is very bad.

Acute Caseous Tuberculosis is the commonest form in which tuberculosis of the lungs appears in childhood. It requires a higher degree of resistance than is to be found in miliary cases. It may be of either a pneumonic or a broncho-pneumonic type. The whole of a lobe, or the whole of a lung may be involved.

The onset is often acute, and may be a sequel to measles, whooping cough, or some other infective disease. Anorhexia, fever, and cough develop, and soon wasting becomes noticeable. There may be some dyspnoea, but cyanosis is not a marked feature until late in the disease. The cough is often violent and distressing, the sputum may be copious, though the bacilli cannot often be readily found. Vomiting and diarrhoea are not uncommon, due in many cases to the swallowing of sputum. The prognosis is usually bad, and the more so the younger the child.

In this type of disease, early diagnosis is most important. The history, the general appearance, and the physical signs should be carefully scanned. In such children, one seems to feel the child is tuberculous long before the signs have been demonstrated. The flushed cheek, the bright eyes, the pale mucous membranes, the lustreless hair, the rough skin, and even the peculiar odor may not be diagnostic, but they are the signals that call for a careful and thorough examination.

Should the usual physical signs be elicited, the diagnosis is not difficult, but when they are not, some reasonable explanation must be given for the presence of other symptoms, cough, expectoration, shortness of breath, pain in the chest, fever. This last is a most important signal, because the progress of the disease will soon reveal its nature, and the delay in making the correct diagnosis serves only to discredit the physician. He should not fail to examine the sputum, record the temperature every two hours, and use the tuberculin tests. There are indeed few diseases of childhood presenting a similar group of symptoms, and yet the condition is often not diagnosed.

Chronic Fibro-Caseous Tuberculosis.—Chronic pulmonary tuberculosis is a type not to be found in children under 4 years of age, and is rare before 6. It requires a still greater power of resistance resulting in the formation of fibrous tissue. The lesions are less frequently apical and more often near the root of the lung. The clinical course and physical signs are similar to those in the adult. With the usual tests and careful examination, the diagnosis is not difficult, if it is remembered that other causes of cough are to be differentiated.

Such a recital as the preceding would be without point were it not for the fact that the responsibility for the early detection of these various forms of tuberculosis rests on others than the members of this Association. To the general practitioners throughout the country must be assigned this duty. The problem presenting itself to this Association at this moment is the measure of assistance which the general practitioner is to receive, and what means if any are to be adopted whereby tuberculosis in childhood may receive more careful and more serious consideration.

The difficulties enumerated are not at all imaginary, and if fewer cases are to escape detection, it would appear to be a reasonable proposition to state that all cases of debility in children, which cannot otherwise be attributed to some definite cause, should rouse in the mind of the physician a suspicion that the underlying cause may be tuberculosis. Many conditions in childhood which have been previously lightly passed over, or which have been attributed to some other causes are really due to underlying infection by tubercle.

The presence of these conditions should open up at once the question as to the possibility of infection by tubercle. It should raise the questions: What is the family history? Has there been exposure by contact? Would it not be well to apply every known test for the presence of tubercle? And even if nothing definite is shown should not the child be given the benefit of all that would have been done had tubercle been detected? Would it not be well to make sure, and thus, perhaps, make it impossible for tubercle ever to be diagnosed in this particular case? How much more far reaching would be the result than to temporize and to procrastinate with the result that a definite case of tubercle of some kind will appear five or ten years later?

General Diagnosis.—The symptoms are as a rule very vague and indefinite but general loss of vigor, wasting or cough will stand out prominently. The condition may have followed measles, whooping cough, influenza, and the

like, and enlarged glands may be felt in the neck. There may be enlarged tonsils and adenoids, but none of them should be allowed to cloud the main issue, viz: That there are prominent symptoms not due to a source which is at once evident. The opportunity for infection by tubercle is a most important point deserving of early attention, indeed, its importance in childhood is far greater than is the case in the adult.

In the physical examination, enlargement of the glands must be sought for diligently. Percussion must be done very lightly but thoroughly. Auscultation must be carefully performed and the results critically scrutinized after allowance has been made for the normal purile type of breathing. The examination of the sputum is very unreliable, but should not be omitted. Samples may be secured even in very young children by Holt's method.

The tuberculin tests are of more value in children than in adults, because a positive result in a young child usually indicates tuberculosis of recent origin. In infancy a positive result may be taken to spell active disease. A negative result indicates with a great deal of probability that the disease is absent. And yet these tests are only partially reliable even in cases known to be tuberculous.

But it is not sufficient to urge the value of these procedures. More is necessary. No apology for such a demand need be made. During the past ten or fifteen years, emphasis has been laid on the need for early diagnosis of pulmonary lesions in the adult, and the insistant attention paid to the subject has not been made without recognizable results, and while it is yet possible to meet the physician who requires the presence of massive consolidation, râles, cavity formation, and bacilli in the sputum before he can diagnose tuberculosis, and while it is usually the same man who is guilty of a second error in regarding the case in which these have been found as incipient, the review of several thousand charts which have been made by a great many different physicians during the past three years, indicates that the new conception has become more generally adopted.

More modern views as to the recognition of similar conditions in children must now be considered as not only of importance but as essentially desirable, and necessary for the following reasons:

1. On account of the prevalence of the disease among children.
2. On account of the frequency with which tuberculosis finds a beginning in childhood.
3. On account of the possibility of arrest when diagnosed.
4. Because the segregation of affected children is so desirable.

For many years emphasis was laid on the care of incipient cases. The advanced cases were not considered. Then the importance of early diagnosis of disease in the adult came to be recognized. Still the advanced cases were not regarded seriously. Later it was recognized as futile to diagnose and treat early cases if advanced cases were left in the homes as centers of contagion. And now a further step is necessary. Of what value is it for us to know that certain post-mortem records indicate that 6 per cent. of cases up to 3 months of age were tuberculous, that the percentage between 3 and 6 months was 17, and between 6 and 12 months it was 22 per cent., if it does not lead us to apply the knowledge in a practical way. It simply

means that special skill in diagnosis in such cases is not needed. It means that whenever there is an infant in a home in which there is an open case of tuberculosis, there is an infant that either has or will contract the disease. In the years immediately following infancy, the conditions are only slightly altered. Contact means contagion.

It is recognized that prevention of tuberculosis is of the greatest value, and as yet little has been done to prevent its development in the rising generation. The consideration given early diagnosis has been all too meagre, and less has been given to the providing of the wherewithal by which exposed cases may be protected, or active cases isolated. A campaign is needed, having for its object general education, tending to make it possible to accomplish:

1. The separation of tuberculous adults from children.

2. The segregation of tuberculous children from those that are presumably healthy, both in homes and in schools.

The preventoria are doing excellent work, as long as definite cases of tuberculosis are excluded. If these are admitted their value is a doubtful quantity. Open air and so-called forest schools are also of the greatest value, but only with a similar proviso. If cases of tuberculosis are to be admitted, the ill-nourished, the anaemic, and the poorly developed are to be directly exposed.

In order that all of these may be accomplished on as wide a scale as possible, is it not desirable that the importance of the subject be brought to the attention of the general practitioner, inasmuch as it is through him that the largest number of cases may be detected, because he is in a position as is no one else to pass in review the children of the various households in which he is in attendance? Is there not a great deal of truth in the following statement made in a recent publication by Murphy of Chicago?

> It does seem difficult, if not impossible, for the profession to advance in practice much beyond the laymen's grasp of surgical conditions as coöperation is essential to practical results. Let us hope that a more potent means of educating the public through the lay press will soon be instituted by some organized body in medicine. This, we believe, would be a most advantageous factor in lessening the morbidity and mortality of disease.

Does not this apply with even more force to the problem of tuberculosis not only in adults but as well in children? And if in any way some steps can be taken by this Association to bring about activity and co-operation, some progress will have been made.

A CLINICAL STUDY OF 228 CHILDREN IN RELATION TO TUBERCULOSIS EXPOSURE CONTROLLED BY VON PIRQUET REACTION

By John B. Manning, M.D., and Howard James Knott, M.D.
Seattle, Wash.

This paper represents a clinical study of 228 children coming under our observation during the past two years as volunteer workers in the Saturday morning Children's Clinic of the Tuberculosis Division of the Seattle Department of Health. It should be understood at the onset of this paper that these children represent a group in the community most likely to give evidence of tuberculous infection since the large majority are children from tuberculous homes. Many other children were seen who cannot be included in this series owing to the incompleteness of their records. The reasons for this are unavoidable since many children come to the clinic but once, and no opportunity is given either for the observation of the Von Pirquet or to confirm any conclusion reached at the time of the first visit. For purposes of convenience in the filing and handling of records in the clinic some definite classification of these cases must be made. Every one coming in contact with tuberculosis in childhood and infancy realizes the difficulty, in many instances, which is attached to making a diagnosis. Unless the classification is very general and permits of considerable elasticity, it is likely only to be a source of confusion, since the interpretation of a case often depends to a large extent on the individual inclination of the examinor. Finer degrees and shades of impaired resonance, finer degrees of prolonged expiration, finer shades of harsh breathing and of paravertebral dullness, we all realize are rather uncertain findings on which to form an exact basis of classification.

CLASSIFICATION IN USE IN THE CLINIC

We have divided our cases in the clinic into three general groups, (1) tuberculous, (2) clinically non tuberculous, (3) non tuberculous. The tuberculous children represent those children giving clinical evidence of tuberculosis with or without a positive Von Pirquet. Clinically non tuberculous, those children giving no clinical signs but giving a positive Von Pirquet. Non tuberculous being those children giving no clinical signs and a negative Von Pirquet.

There is a large number of cases constantly carried along in the files with diagnosis deferred. These records form that group previously referred to as being unusable in this series. While the above classification is the one in use in the clinic at present, for the purpose of this paper, which is a study in relation to home exposure, these cases have been tabulated somewhat differently.

(1) Children with definite history of exposure.

(2) Children with no history of known exposure.

We assume that in a large series of cases such as this, that for all practical purposes the cutaneous tuberculin reaction of Von Pirquet is nearly as reliable as the "stichreaction." Veeder, in a recent study of 1321 children in St. Louis, reached the conclusion that the intradermic tuberculin reaction gave but a slight increase in the percentage of positive cutaneous reactions. The Von Pirquet test is made by the nurse, but under our supervision, with one-half strength "old tuberculin." Since these reactions have been carefully made, where they were negative, in many instances they have not been repeated. It is difficult in a clinic of this sort to retest each negative reactor, no matter how desirable it might be to do so. Several negative reactions have been repeated once and in some instances twice without change. I feel sure that subsequent cutaneous tuberculin tests made within a short tine on those giving a negative reaction at first examination, would have altered our series only to a limited extent. There are 166 children out of the 228 who have been or still are living in intimate contact with active adult cases. In the remaining 62 there is no known exposure. These adult contacts, in most instances, one or the other parent, in a few instances both parents, or older brothers or sisters are in the stage of lung invasion in varying degrees of activity. As many as can be have been segregated at the new City Tuberculosis Hospital at Firland.

CHILDREN WITH A DEFINITE HISTORY OF EXPOSURE

There are 84 children of the 166 with a definite history of exposure who give a positive Von Pirquet test, or about 50.6 per cent. Of this number, as naturally would be expected, the largest part, 69 or 82.1 per cent., shows no clinical evidence of tuberculosis. It has for some time been the teaching that tuberculosis in an infant progresses rapidly toward a fatal termination. More recently, however, Halm, Ibraham and Eichelburg have reported cases to prove that prognosis is not absolutely bad in infants. While these children of the clinically non tuberculous group bear their infection with the tubercle bacilli without apparent harm, their systems probably being proof against the organism, nevertheless, we attempt a close observation of these children. Each few weeks they return. We have been unfortunate enough in a few cases to observe an inactive tuberculosis assume alarming evidences of activity, even among older children. There are a few from this group, nine in all, in whom one of us has recorded questions of finer shades of impaired resonance or harsh breathing, where one did not at the same time seem justified in regarding such indefinite findings as constitutional signs. It would probably be better to classify these clinically non tuberculous children as suspicious. There are fifteen children, representing 17.8 per cent. of those children exposed to tuberculous who give a positive reaction and clinical evidence of tuberculosis. They show varying degrees of activity and types of infection, including seven cases of bronchial glands tuberculosis, one active keratitis, two with cervical edenitis, four with distinct lung invasion, and one with tubercular peritonitis. Since this paper has been undertaken, one inactive, clinically non tuberculous individual developed an active tuberculous peritonitis right under our personal observation.

Most of those so diagnosed as bronchial glands tuberculosis, are children with a distinct history of not doing well, with sub-normal or slightly elevated temperature, frequently complaining of pain in chest or back, poor appetite, weakness or listlessness, with dilated chest veins, but no physical evidence of tuberculosis except sometimes paravertebral dullness. Radiographs showed corresponding shadows about the right hilus. The absence of any bone cases is due to the fact that we have in Seattle a splendid orthopedic hospital, the Children's Orthopedic Hospital, and cases of that character are early recognized and sent to that institution.

There were 82 children with a definite history of exposure who gave a negative Von Pirquet. This represents about 49.3 per cent. who give negative reactions out of the total 166 exposed to tuberculosis. One of these children gives distinct clinical evidences of tuberculosis, in which instance, as would be expected, the process has advanced to the third stage. There are eight where one of us recorded questions of finer shades of harsh breathing. In view of the fact that cutaneous reaction is negative in the presence of measles, it is only fair to state here that none of these children had measles at this time or within recent date.

CHILDREN WITH NO HISTORY OF EXPOSURE

The children we have just been considering were children sought out and brought to the clinic especially, by the nurses of the department, owing to their known intimate contact. These 62 children whom we now consider were brought to the clinic because of poor nutrition or by fear that something of the nature of tuberculosis might be present, rather than because of any known exposure. Fourteen of these 62 children, or about 22.5 per cent. give a positive Von Pirquet, the remaining 48, or 77.4 per cent. give a negative test.

TABLE 1

	Von Pirquet		Von Pirquet	
		per cent.		*per cent.*
166 children exposed	84	50.6	82	49.3
62 children with no known exposure	14	22.8	48	77.4
228 children	98	42.9	130	57.1

It is interesting to note in this table that in the entire series of 228 children, with so large a number having known exposure, the percentage of positive reactions was only 42.9 per cent.

The assertion made by Fishberg[1] in his paper "On the Cutaneous Tuberculin Test in Children of Non-Tuberculous Parentage," that the difference between those who lived in a tuberculous milieu and those who had no contact with consumptives in their homes, is apparently insignificant, cannot be borne out by this series. In fact, decidedly the contrary is the case. There are many interesting problems one encounters in such a series as this, where children exposed both to a tuberculous mother and father who are in active stages of lung invasion, should react negatively with every opportunity of infection.

Again, one child with equal exposure yields a negative reaction, while all the other children in the family react positively.

In considering the entire series by ages, as a majority of similar investigators have done, we have the following results.

TABLE 2

Age	Number Tested	Per cent of Positive Reactors	
		per cent.	
Under 1 year	7	2	28.5
Under 2 years	10	7	70.0
Under 3 years	12	4	33.3
Under 4 years	33	15	45.4
5–7 years	37	13	35.1
7–10 years	58	17	29.3
10–15 years	70	40	58.1

The high percentage of positive reactions under two years is due to the fact that the whole number (10) is not large and nearly all of these were brought in because of a death recently of one or the other parent. Otherwise, the series corresponds in general with similar studies illustrating the fact that the reaction gradually becomes more frequently positive until 10–15 years of age where the maximum is reached.

BRIEF REVIEW OF SIMILAR STUDIES

For purposes of convenience in contrasting these similar studies we have followed the grouping of our cases in a general way with Von Pirquet's proposal for an international statistical study of the frequency of tuberculous infection in children. There are many extensive articles on different phases of the cutaneous tuberculin reaction in children, in which this aspect has been neglected or only slightly touched upon, and are not usable.

Tabulating for purpose of convenience these similar studies, we have the following:

Name	No. of Children Tested	Age at which Largest Percentage of Positive Reactions are Obtained	Percentage of Reactions
		years	*per cent.*
Von Pirquet (2)	1,407	13–14	93
Hamburger (3)	532	13–15	95
Hellesen (4)	480	10–14	46
Shaw and Laird (5)	330	over 6	45
Meroz and Khalatoff (6)	337	10–15	78.6
McNeil (7)	541	4– 5	45
Sachs (8)	217	10–15	60
Berberich (9)	800	10–15	58.8
Lapage (10)	1,000	5–10	60.8
Ariete (11)	38	7–11	59
Fishberg (12)	692	14	83.79
Fishberg (13)	588	14	75
Veeder and Johnson (14)	1,321	10–14	44
Manning and Knott	228	10–15	58.1

Fishberg's two series and our own were studied particularly in relation to tuberculous exposure.

COMMENTS ON INFLUENCE OF COMMUNITY CHARACTERISTICS OF CLIMATE, HOUSING, SANITATION, ETC.

The disparity of results obtained by various observers cannot be easily explained. Frazier (15) is of the opinion that discrepancies must be attributed to differences of technic and to an agreement as to what constitutes a reaction; as different methods of scarifying, the depth of abrasion, the concentration of tuberculin. The technic is so simple that this factor, we believe, differs very slightly in any carefully observed series. The assertion has frequently been made that nearly all children at fifteen years of age are tuberculous. In support of such an assertion the figures already incorporated into this paper, of Hamburger and Von Pirquet especially are noted. What right have we, however, to assert that what is true of Vienna is true of our own community. One of us (M), has seen both of these clinics and spent a month in Hamburger's, and has never seen in any clinic so many children with third stage tuberculosis as in Hamburger's clinic. Rather than differences in technic must we believe of far more importance in explaining difference of frequency of tuberculosis in children in different communities, are peculiarities of climate, sanitation and housing of these different communities. Children frequenting the Poliklinik and the Kinderklinik in Vienna come from poorly heated, poorly ventilated, stone houses standing side by side, row after row of five story buildings. Many of these buildings and rooms standing years, probably have been inhabited by more than one generation of consumptives. This situation contrasted with the community characteristics of a new community like our city must explain these discrepancies. In a climate favorable to open air living, with a community made up of separate houses, and furthermore, with each home a comparatively new, modern house, and probably few, if any, over twenty-five years of age, the number of community focii of tuberculous infection must be far less in Seattle than in Vienna.

CONCLUSION

In a clinical study of 228 children in relation to tuberculous exposure controlled by the cutaneous Von Pirquet, we find that contrary to the findings of Fishberg; children living in tuberculous milieu and those who had no known contact with consumptives show marked differences; those living in tuberculous surroundings reacting in ratio of about 2 to 1 of those living in an environment not known to be tuberculous. Further, we find the number of positive reactors in the entire series is only 42.9. per cent. We also find that the number of children between ten and fifteen years reacting positively to the cutaneous tuberculin reaction, in a series where the majority of the children are from tuberculous homes, is 58.1 per cent., far below the figures of Hamburger, 95 per cent., and Von Pirquet, 93 per cent.

These discrepancies are due, in our opinion, to community characteristics of climate, housing and sanitation.

BIBLIOGRAPHY

1. Fishberg: Arch. Pediat., '15, xxxii, 1, 20.
2. Von Pirquet: Jour. A. M. A., 1909, lii, 675.
3. Hamburger: Med. Klin., March 30, 1913.
4. Hellesen: Jahrb f. Kinderhk, June 12, 1909.
5. Shaw and Laird: Arch. Pediat., xxvi, 488.
6. Meroz and Khalatoff: Rev. Med. de la Swisse Romande xx, Oct. 1914; abst. Arch. de Med. des Enfants, xvi, 1913, 307.
7. McNeil: Edinburgh Med. Jour., viii, 4, 324.
8. Sachs: Trans. Intern. Cong. on Tuberc., ii, 484.
9. Berberich: Abst. Arch. de Med. des Enfants, xvi, 307.
10. Lapage: Brit. Jour. Child. Dis., ix, 1912, 497.
11. Ariete: La Pediatrica, iii, 1913.
12. Fishberg: Arch. Pediat., xxxi, 96.
13. Fishberg: Arch. Pediat., xxxii, 1, 20.
14. Veeder and Johnson: Am. Jour. Dis. Child., ix, 478.
15. Frazier: Med. Rec. xxxii, 57; Med. Rec. lxxxvii, 2, 57.

DISCUSSION ON PAPER BY DR. MANNING

Dr. O. W. McMichael, Chicago: I have listened with great interest and would emphasize one point, that is the frequency with which we get a negative reaction in children whom we know to have been exposed. I have come to the conclusion that we should be very careful in saying the child is non-tuberculous, on account of a negative von Pirquet. A child, one year of age, or under, nursed by a tuberculous mother, will rarely react to the von Pirquet. Where I see a delicate child constantly exposed to an open case of tuberculosis I think the child is so saturated with tuberculosis that it cannot react. I regard that as positive evidence of infection.

Dr. Gerald B. Webb, Colorado Springs: I congratulate Seattle on having so low an infection. I would like to ask how the von Pirquet test is made by the nurses.

Dr. Charles C. Browning, Los Angeles: I wish to coincide with what Dr. McMichael has said in regard to the cutaneous test. I believe that a negative cutaneous test, especially standing alone, is valueless. It is of value in connection with general symptomatology and history only. In my own work I have for years applied the cutaneous test with the use of O. T. and bouillon filtrate, human and bovine. In a certain number of cases you get a reaction to one and not to the others. I have not tabulated the cases but I believe that in the cases which tend to latency you will more frequently get a reaction from the filtrate, when the O. T. will be less pronounced or negative. Again in declining cases, if they begin to improve in physical condition, I think that they often respond to the test. My work has been more with adults. Occasionally at the end of 48 hours when there is no reaction, I have given ¾ grain sodium cacodylate and the reaction has become positive. I quite admit the possibility of delayed reaction, but in these cases we hardly expect that. In a number of these cases where there is marked anaemia, after a few doses of sodium cacodylate, a re-application of the test will give a good reaction. This procedure is open to the criticism of sensitization, but I think it is worthy of consideration.

Dr. John Ritter, Chicago: There is just one point that I wish to emphasize. I was very much interested when the doctor speaks of cases of measles where he gets negative results. That is as it should be. If we analyze this we find that the skin is the field where changes in toxic matter takes place and while the structure of epithelial cells of the skin are eliminating the toxins of measles we get no reaction but when this is eliminated we will again get reaction because the skin cells will then again take up the tuberculin.

Dr. Manning: In regard to Dr. Webb's question, I don't see why the von Pirquet test should not be made by the nurses. It is done right in the clinic, under my personal supervision, and I think done as I would do it myself.

DOES THE GENERAL PRACTITIONER UTILIZE THE MEANS AT HIS DISPOSAL FOR THE DIAGNOSIS OF EARLY PULMONARY TUBERCULOSIS?

By James S. Ford, M.D.

Wallingford, Conn.

The annual report of this Association shows that during the year of 1914 over $20,000,000 were spent in combatting and preventing the spread of tuberculosis. The question naturally arises do the results obtained as "shown by a lowered death rate which is the final criterion by which the success or failure of the anti-tuberculosis campaign must be determined"[1] seem to be commensurate with this immense sum expended, and if not, where does the fault lie? I believe that most men engaged in the work of prevention and treatment of this disease will admit that the results are not what they should be as regards this lowered death rate. True it is that during the past ten years the death rate has been reduced from 166.7 to 127.7 per 100,000 but it seems as though we should expect a greater cut when one thinks over the widespread and active campaign that has been waged against this enemy of the human race.

Ten years ago it was said that those among the general public suffering from tuberculosis consulted the physician only when the disease had reached an advanced stage and the chance of arrest was small or entirely lost. After these years of an active publicity campaign of education, no such indictment can be brought against the laity and we must seek the cause of this continued high death rate nearer our own door. It would not be at all amiss to ask, is the general practitioner doing his share by utilizing all the available methods at his disposal for the diagnosing of early pulmonary tuberculosis, and, having made the diagnosis, does he give the patient the proper advice as to his future course of life? I say the "general practitioner" because it is in his hands that most of these cases fall in the beginning.

In order to see just what was being done by the family doctor in his efforts correctly to diagnose pulmonary tuberculosis, and to advise those consulting him, I undertook a study of 1000 cases that had been admitted to the Gaylord Farm Sanatorium from October, 1907 to January, 1915, and I think that some of the figures and facts obtained are, to say the least, interesting.

In the study of these cases they were divided up into groups determined by the stages of their disease on admission and these showed the following:

There were 31 non-tuberculous cases (or 3.1 per cent. of the total number).
148 incipient cases (or 14.8 per cent.).
741 moderately advanced cases (or 74.1 per cent.).
80 far advanced cases (or 8 per cent.).

We undertook to find out how many physicians had been consulted before a diagnosis was made or before the patients applied for admission to the Sanatorium.

Taking up first the 31 non-tuberculous cases, we found that they consulted 56 different physicians of whom 37, or 66 per cent., made a physical examination only; one of these taking an *x*-ray picture in addition. Two others examined the patients through clothing.

Six, or 10.7 per cent., examined chest and sputum.

Six, or 10.7 per cent., examined chest, took temperature, but made no sputum examination.

Four, or 7.1 per cent., examined chest, took temperature, and examined sputum.

Three, or 5.3 per cent., made no examination whatever.

It certainly seems that something is woefully lacking when 6 per cent. of the physicians consulted make no examination whatever, and only 7 per cent. utilize all the methods at their disposal to make a correct diagnosis.

The figures obtained from the incipient class do not show up as well as this non-tuberculous group. Here we have 148 cases who consulted 254 physicians of whom 160, or 62.9 per cent., made an examination of chest only, and 11 of these made this examination through the patients' clothing.

Two, or 0.8 per cent., took temperature only.

Three, or 1.1 per cent., examined sputum only.

Twenty-seven, or 10.7 per cent., examined chest and sputum, but did not take temperature.

Fifteen, or 6 per cent., examined chest, took temperature, but did not examine sputum.

One, or 0.4 per cent., took temperature and examined sputum, but made no physical examination.

Seven, or 2.8 per cent., examined chest, took temperature, and examined sputum.

Thirty-nine, or 15.3 per cent., made no examination whatever but treated the patients for various ailments as "run down," anemia, malaria, and "walking typhoid."

Here we have only 3 per cent. of doctors making use of most of the diagnostic methods available while over five times that number made absolutely no effort whatever to find the seat of the trouble but would, by their negligence or carelessness, allow a case with an excellent opportunity of arrest and a return to normal life go on to a far advanced stage. Nor does this condition of apathy as regards complete examination apply only to those who have been admitted to our institution.

Stoll,[2] in a study of 150 cases at Wildwood Sanatorium at Hartford, showed that of 37 incipient cases 35 per cent. were not examined on their first visit to their physician, but he does not say how many were not examined at all. Further on he says that of 147 cases, 16, or over 10.5 per cent., were never told they had tuberculosis until they entered the institution though 75 per cent. of these cases had symptoms for at least 5 months before consulting their medical adviser.

Think of the amount of infection that such cases might spread, either because the physician consulted had not taken the time or trouble to find the underlying cause of his patient's complaint, or if having found it, he neglects to lay down a few fundamental principles that could at least prevent the unfortunate victim of tuberculosis being a menace to his family and to the community at large.

Dearholt quoted by Hawes,[3] in a study of 1400 cases of tuberculosis in the State of Wisconsin, showed that of 195 registered cases 60 either were not told the nature of their complaint or had their condition misrepresented to them by the first physician consulted, and of 159 cases not registered, 91 were deceived or left in ignorance of their true condition. Hawes also shows in this same article that during the 6 months between August, 1903 and February 1904, of 100 cases that had applied to the Tuberculosis Clinic of the Massachusetts General Hospital, but 15 were incipients and that 12 of these had a positive sputum before applying, making a diagnosis easy. From November of 1911 to May of 1912, of 100 cases coming to this same clinic, 30 were incipients of whom 16, or 53.3 per cent., had a positive sputum, and were thus enabled to get an early start in their treatment.

In our incipient group but 38 physicians, or 26 per cent. of the 148 consulted, examined the patient's sputum; furthermore 25 patients, or 16 per cent. of this same class, found to have a positive sputum on admission, had never had their sputum examined by their own physician. So we see that a large percentage of the general practitioners neglect to avail themselves of the opportunity of having a sputum examination made at no cost of money or effort to themselves. Frequently the diagnosis of pulmonary tuberculosis could be made by them weeks before it is, and these are indeed valuable weeks to the patient.

Our moderately advanced group consists of 741 cases who consulted 1468 physicians. 809, or 55.1 per cent., of these made a physical examination only, of whom 122 made this examination through the patients' clothes. 316, or 21.5 per cent., examined chest and sputum, 29 of this number made the physical examination without the patient removing his clothing.

Eighty-eight, or 6 per cent., examined the chest and took the temperature, but made no sputum examination and 13 did not have the patients strip to the waist.

Ten, or 0.7 per cent., took temperature only.

Eleven, or 0.7 per cent., examined sputum only.

Two, or 0.02 per cent., took temperature and examined sputum, but made no physical examination.

One hundred and six, or 7 per cent., made a thorough physical examination, took temperature, and examined sputum.

One hundred and twenty-six, or 8.6 per cent., made no examination of any kind nor took temperature. There was absolutely no effort made to discover any abnormal condition and you may rest assured that the advice given was in accordance with the examination.

I did not take into consideration the number of patients in this moderately advanced group that first consulted their physician for hemorrhage and who

even then were told that there was nothing the matter with their lungs. It seems that even today many physicians have not learned that the spitting up of blood generally means tuberculosis, but will assure the patient that the blood comes from the back of the throat or any other conceivable place. There seems to be need of educating the general practitioner that hemorrhage is always to be considered tuberculosis, as Hawes says, unless there is clear evidence to the contrary. One of our cases consulted her physician for hemoptysis who, after listening to the history and without making an examination of any kind, told the patient that a diseased appendix was the cause of her hemorrhage and advised an immediate operation. There may be some excuse for a man who carefully examines his case but makes a wrong diagnosis, but there is absolutely no excuse for the man who takes neither time nor trouble to go over his patient.

The examination of sputum in the moderately advanced cases should be of great value to the physician, yet in these 741 cases 250 had never had a sputum examination before admission and 130 of these were found to have a positive sputum when they entered the sanatorium. Of the 1468 physicians consulted but 425, or 28.9 per cent., thought it worth while to have a sputum examination made. Furthermore as to the value of sputum examinations to the general practitioner may be cited the fact that there were 59 cases under treatment for various conditions for a period of 1 to 13 months, during which time there was present both cough and expectoration and yet the assurance was given that there was nothing the matter with their lungs until the sputum was returned positive. Barnes,[4] in 165 cases with expectoration, showed that the physician failed to diagnose tuberculosis accompanied by a failure to have the sputum examined in 31, or 18.7 per cent., and the delay in diagnosis by such failure was from 2 to 96 months with an average of 10.3 months.

When 126, or 8.6 per cent. of physicians consulted make no attempt to make an examination of any type little progress can be made to wipe out this great menace to humanity. Barnes shows that of 66 cases, 8 or 12 per cent. did not have their lungs examined by the physician first consulted and the delay in diagnosis was from 2 to 20 months with an average delay of 5.1 months.

Even when we come to our far advanced group there is not the care taken to have the diagnosis made as promptly as it should be. We have studied the histories of 80 advanced cases, or 8 per cent. of the entire number, and obtained these figures:

They consulted in all 162 physicians.

Seventy-nine, or 48.7 per cent., made only a physical examination and 16 of this number made the examination through clothing.

One, or 0.6 per cent., took temperature only.

Thirty-two, or 20 per cent., examined chest and sputum.

Five, or 3 per cent., examined chest and took temperature.

Sixteen, or 9.8 per cent., examined chest, took temperature, and examined sputum.

Twenty-nine, or 17.9 per cent., made no examination of any kind.

In the last two items you are brought face to face with the fact that there are more men who make no examination whatever than there are men who are utilizing all the means at their disposal in their efforts to make a correct diagnosis.

Perhaps a summary of all our study at this time would not be out of place. There were as I said in the beginning 1000 cases and these consulted 1940 physicians of whom

One thousand and eighty-five, or 55.1 per cent., made a physical examination only and of this number 151 did not deem it worth while to have the patient strip.

Thirteen, or 0.7 per cent., took temperature only.

Fourteen, or 0.7 per cent., made a sputum examination only.

Three hundred and eighty-one, or 20 per cent., made a chest and sputum examination.

One hundred and fourteen, or 6 per cent., examined the chest, took temperature, but did not make a sputum examination.

Three, or 0.02 per cent., took temperature and made a sputum examination, but no physical examination.

One hundred and thirty-three, or 7 per cent., made a chest examination, took temperature, and examined sputum.

One hundred and ninety-seven, or 10.2 per cent., nade no examination of any kind.

Laverson[5] of California, in a similar study—made however on only 54 patients who consulted 72 physicians, got the following figures:

52.7 per cent. made only a physical examination against our 55.1 per cent.

12.8 per cent. made a physical examination and took temperature against our 6 per cent.

4.1 per cent. made a physical and sputum examination, but made no temperature record against our 20 per cent.

13.8 per cent made no examination of any kind against our 10.2 per cent. and Barnes' 12 per cent.

Only 1 physician, or 2 per cent., took all the means necessary to make a diagnosis against our 7 per cent.

The value of a temperature record appears to have been overlooked by the great majority of physicians consulted. Only 263, or 13.4 per cent., made use of a thermometer, and there is no doubt but that many of those who did not use one would have obtained as much, if not more, information, than they did with a stethoscope. The average practitioner should have it thoroughly impressed upon him that a continued afternoon or evening rise of temperature, in spite of the absence of physical signs or his inability to locate them, should at least make him suspicious of a tuberculous infection.

From these figures it can be seen that the attitude of the general practitioner in not making use of the routine measures of physical examination, taking temperature, and examining sputum is not confined to any one locality but seems to be widespread from the Atlantic to the Pacific.

The problem of the eradication of tuberculosis has been put wholly up to the physician and Miller,[6] before the Canadian Medical Society, said last

year that "it is not the delay and ignorance of the patient in seeking advice but the inability of practitioners to diagnose the disease in time, that is today the greatest clog in the forward movement to meet and cope with tuberculosis." He also read replies received by him from the sanatorium men in Canada and a few in this country as to the average practitioner's ability to recognize (a) incipient, (b) moderately advanced, and (c) far advanced tuberculosis. The answers gave the general impression that the average practitioner rarely, if ever, diagnoses incipient tuberculosis. As to moderately advanced cases but one-quarter to one-half are recognized and then called incipient, and the ability to recognize far advanced cases is about on the same level as the moderately advanced type.

There is something radically wrong when a very large percentage of men in the practice of medicine are unable to recognize not only in its incipiency but even in the moderately advanced stage the most common disease on the face of the earth today. Why this state of affairs should exist is to most minds, I believe, unaccountable and it must be put down in a great many cases to nothing more than carelessness.

The medical schools are not without blame for this above state of affairs for until very recent years the teaching of tuberculosis was done wholly in a haphazard manner. Few if any of the men who acted as instructors in this disease had any special training either in its diagnosis or treatment: there were no special clinics for the patients suffering from tuberculosis nor was any attempt made systematically to follow up these unfortunate sufferers. Even today there are but a small number of medical schools in the United States that give an adequate course in tuberculosis and up to one year ago but one school in Canada thought this disease of enough importance to have a chair for the teaching of it. Such conditions must be materially remedied if we hope to have the newly graduated medical men recognize incipient tuberculosis and treat it intelligently.

Abrahams,[7] in a recent article on *Errors in Diagnosis*, puts down those due to an incomplete examination as the most prolific cause of all and he further states that many avoidable blunders result from this. He speaks, especially, of the haste with which physicians work; of not carefully examining the seat of trouble; that sometimes patients object to special examinations and adds that it is far better to relinquish the case, lose a patient, and save your reputation; he especially refers to the examining of patients through their clothing and asks how it is possible in such cases to distinguish slight modification of breath sounds and to discern fine râles which are present in the early cases of tuberculosis.

It now seems as if there should be an awakening of the general practitioner to the part he is to play or should play in the overcoming of pulmonary tuberculosis and he should not be allowed to sit supinely by and see his cases left at home or sent to sanatoria in an incurable condition when, by a little work on his part, such a case might have had a chance for an arrest and be able to return to his work and family.

Such figures as 133 men, or 7 per cent. of 1940 making a conscientious effort to make a correct diagnosis by means of physical examination, taking of

temperature, and examining sputum, against 197 men, or 10.2 per cent., who make absolutely no effort whatever to get at the seat of the patient's complaint do not reflect any great credit upon the body of the medical profession. And as I have said before, this same percentage of conscientious and non-conscientious men as regards the diagnosing of tuberculosis seems to be the same in all parts of this country and Canada.

The advice given to most of these patients for whom the diagnosis was made was, in a majority of cases, of little value. They were told to stay in the open air, get an outside occupation, and to take eggs and milk. Absolutely nothing was said to them as to the amount of rest that they required, or anything told as regards the care of the sputum or the shielding of the mouth during coughing or anything else that would tend to lessen their being a source of danger to those with whom they came in contact. It is evident then that when the general practitioner does diagnose pulmonary tuberculosis he is unable to outline a systematic course of treatment for his patient.

These then are the facts as deduced from our study and now appears to be the time that the members of this Association should seriously consider and devise some means of impressing upon the members of the medical profession the necessity of utilizing all the means at their disposal for the diagnosing of tuberculosis in its incipiency when the chances for arrest are excellent and so to drive this relentless and unmerciful foe of the human race from the face of the earth.

I wish to thank Dr. David R. Lyman for the use of his records and the encouragement given me in the preparation of this paper.

REFERENCES

1. "Sustained Interest in the Problem of Tuberculosis," editorial, Journal of the American Medical Association, March 6, 1915.
2. Stoll, Henry F.: Yale Medical Record, vol. xv, No. 7, 1909, p. 335.
3. Hawes, 2nd, John B.: Boston Medical and Surgical Journal, February 8, 1912, p. 195.
4. Barnes, Harry L.: Journal of the American Medical Association, February 16, 1907, p. 602.
5. Laverson, Ralph S.: Journal of the American Medical Association, April 18, 1914, p. 1245.
6. Miller, A. F.: Canadian Medical Journal, September 1914.
7. Abrahams, Adolph: Practitioner, London, England, March, 1915, vol. xciv, No. 3, p. 380.

DISCUSSION ON PAPER BY DR. FORD

Dr. Isaac W. Brewer, Geneva, N. Y.: In my work in the New York State Department of Health I have to oversee the work done by a narge lumber of health officers. Each one of these keeps a register of cases of tuberculosis. Recently I examined one of these registers and of 68 cases recorded all that could be traced had died within 6 months from the time of registration. In other words either the physicians in that vicinity were unwilling to make a diagnosis, or were unable to make a diagnosis or the patient did not see a physician until very late in the disease. The latter only applies to a very few cases. The cases cited are far from uncommon. We need to get the

coöperation of the general practitioner and have him make an early diagnosis if we are to win this fight against tuberculosis.

Dr. William Charles White, Pittsburgh: The great lesson to be learned from Dr. Ford's paper is that the fundamental thing in clinical examination should be thoroughness. Few of the mistakes outlined in the paper would have occurred if the examiners had been careful to use all means at their disposal. The lack of thoroughness is a great human weakness, but much can be done in the teaching in our medical schools and societies by reiteration of the principle to make the quality of thoroughness a more potent factor in the doctor's work, and thus secure to the patient the great benefits which are bound to result from its observance.

THE X-RAY AS AN AID IN THE STUDY OF PULMONARY TUBERCULOSIS*

By Ray W. Matson, M.D.

Portland, Oregon

As a result of our experience with the *x*-ray carefully controlled by previous physical examinations, and many autopsies, we are convinced that the x-ray supplies invaluable information regarding the location, character and extent of the disease, thus confirming the result of our physical examination and furnishing objective proof of its correctness. It reveals the effect of tuberculosis upon other structures within the chest cavity. Especially interesting are retractions of the heart, great blood vessels, trachea and esophagus. While it has been thought that palpation of the trachea in the neck gives a clew to its course in the chest, it is certain that it is not to be compared with careful plating for the determination of the exact position. The *x*-ray supplies information which enables one to foretell with greater accuracy the probable course of the disease; for instance, in cases of extensive disease of one lung with compensatory emphysema of the other, the respiratory sounds are so altered that it is difficult to determine the extent of the disease; especially so, when, as a result of these changes, an impairment of the percussion note, or rales, are not present. In cases of this type we have always to suspect a bronchogenic infection of a central portion of the lung, and the *x*-ray reveals the extent and character of this infection not otherwise attainable. Many times the plate shows changes far more extensive than could be determined by the physical examination alone, and this is of prognostic importance.

In tuberculosis justifying surgical interference, the use of the *x*-ray is indispensable. In cases selected for artificial pneumothorax we have found the *x*-ray of tremendous value in observing the degree of lung compression and the influence of the same upon the mediastinal contents; presence or absence of adhesive bands, etc.; the healing or advancement of the disease can be watched by means of the *x*-ray; and plates taken at various intervals furnish a photographic record of the case. A comparison of these plates is an interesting study. In children particularly, where ordinary physical examination is difficult, it is extremely useful; and its value in the case of infants cannot even be surpassed by the physical examination in cases where tuberculosis must be eliminated.

The *x*-ray findings must be interpreted with great caution and only by one thoroughly familiar with the pathology of tuberculosis infection; the interpretation must be done by the clinician himself; one cannot differentiate active from inactive tuberculosis by means of the *x*-ray alone; we have many cases

* A synopsis of an illustrated address.

with inactive tuberculosis which have been under observation many years, wherein the *x*-ray shows findings not to be differentiated from cases of active tuberculosis with all the clinical and physical findings. The *x*-ray supplies a shadow corresponding in size to the extent of the disease; the distribution of this shadow corresponds with the distribution of the pathological lesion; therefore, a knowledge of pathology is necessary for correct interpretation of *x*-ray findings. The distribution of lesions in miliary tuberculosis, disseminated confluent tubercle, caseous pneumonia, peribronchial tuberculosis, etc., are more or less constant in the section room, and the plate is nothing more than a negative of the shadows produced by these lesions.

He who attempts the interpretation of findings without a knowledge of the pathological distribution of lesions will make mistake after mistake. In the recognition of tuberculosis of the tracheo-bronchial lymph-glands the *x*-ray is of value equal or superior to physical examination.

One must use great caution in diagnosing cavities as the result of the plate alone; adhesive bands when circularly arranged, so closely resemble cavities that even an expert will make mistakes if his work is not controlled by physical examination and clinical history. We have proven the nature of these shadows in our lung compression work with roentegenological studies; in many cases of this type we have seen these adhesive bands enlongated, accompanied by pain and high manometer readings under the influence of gas pressure, followed by rupture, relief of pain, low manometer reading, the *x*-ray showing that the bands had ruptured. This diagnosis of miliary tuberculosis by means of a plate alone, in our opinion, cannot with absolute certainty be made; viz., a man of 35 who complains of illness of 3 weeks' duration, with the clinical history of ordinary cold; sputum positive; plate showing disseminated, sharply defined spots with a diffuse border, corresponding exactly in size, shape and distribution to miliary tubercle. The Roentgenologist would unhesitatingly diagnose miliary tuberculosis. If, however, we examine the case more carefully, we find the patient is fever-free, pulse normal, no dyspnea; patient looks and feels decidedly unlike a case of miliary tuberculosis. Physical examination reveals impairment over right apex, with fine crackling rales and broncho-vesicular breathing over impaired area. Over remaining portion of both lungs, breathing sharp vesicular with fine crackle at end of inspiration; findings not incompatible with diagnosis of miliary tuberculosis. However, when we learn that patient was a miner and that during six months' observation the *x*-ray findings have remained unchanged and at no time has he presented any clinical signs of miliary tuberculosis, we are forced to diagnose this as a case of tuberculosis of the right apex and pneumoconiosis, the later condition accounting for the spot-like shadows.

DISCUSSION ON PAPER BY DR. MATSON

Dr. William Charles White, Pittsburgh: I want to thank Dr. Matson for this study. Most clinical men have suffered at the hands of the *x*-ray operator. Not only by his exorbitant charges, but also by his methods and ignorance of pathology.

It is a common thing for the *x*-ray operator not only to take the picture, but to diagnose and treat the cases. This frequently results in the death of the tuberculous case because of faulty advice.

Several things seem true to me in this matter.

First: The *x*-ray picture is one of the most valuable clinical methods we have.

Second: It should be part of the equipment of every sanitarium and office if possible.

Third: The picture and the report should be interpreted by the clinician with the *x*-ray operator's help.

Fourth: The advice to the patient should be given by the clinician based upon a complete clinical and social study of the case.

My advice to my students is to use the method of the other laboratories of the school, that is to compare the abnormal with the normal and to demand from the *x*-ray operator a normal picture for comparison if they are in doubt about the findings which he indicates.

Nothing is harder to diagnose by *x*-ray than early tuberculosis, but we can all learn to utilize this most valuable method more than we do.

PREVENTION AND CARE OF LARYNGEAL TUBERCULOSIS

By Julius Dworetzky, M.D.
Otisville, N. Y.

The twentieth century atmosphere is laden with innumerable ideas on the prevention of disease, and it would seem that in prevention lies the solution of the numerous problems. We vaccinate people to prevent smallpox; we inspect and pasteurize our milk in order to reduce infant mortality; we filter and guard our water supplies from contamination to prevent typhoid and other water-borne diseases; we advocate out-door life and improved hygienic surroundings to prevent pulmonary tuberculosis. But we are not taking sufficient measures to prevent the most common complication of pulmonary tuberculosis, and that is tuberculosis of the larynx.

Tuberculosis of the larynx is undoubtedly the most frequent complication of pulmonary tuberculosis. Robert Levy[1] says that laryngeal tuberculosis is a very frequent complication of pulmonary tuberculosis occurring approximately in one-third of all cases. Sir St. Clair Thomson[2] found laryngeal tuberculosis present in 25.6 per cent. of 693 cases. Of 500 adult patients examined at the Otisville Sanatorium[3] laryngeal tuberculosis was diagnosed in 25.6 per cent. of the cases—the perfect agreement with Sir. St. Clair's Thomson's figures being a striking coincidence. Although no longer speaking of laryngeal tuberculosis as the "death-warrant" we all still agree to the graver prognosis in laryngo-pulmonary cases. Sir St. Clair Thomson[4] finds the prognosis in laryngo-pulmonary tuberculosis about twice as gloomy as in uncomplicated cases. Hence it would follow that if the average life of a patient with chronic pulmonary tuberculosis is eight years[5] the life of a patient with laryngeal complication would be about four years. Thus we can all see the tremendous loss of life caused by this complication.

The mere treatment of this complication as it arises without an earnest effort at prevention has always seemed to the writer to be an unsatisfactory method of procedure. The etiology of laryngeal tuberculosis is so thoroughly understood that its prevention ought to be a far easier problem to solve than that of its parent lesion—pulmonary tuberculosis. In a previous paper the writer[6] carefully described the direct and predisposing etiologic factors which enter into the causation of laryngeal tuberculosis. The policy of the Otisville Sanatorium, like that of other institutions of similar character, has been to check and possibly cure pulmonary tuberculosis by causing fibrosis of the pulmonary lesion and by raising the body's resistant power. However, in addition to the above we are also endeavoring to confine the lesion to the lungs and prevent infection of the other organs especially the larynx.

The great majority of recent authorities, including Thos. J. Harris, Levy,[7] Bonney,[8] and Ballenger,[9] agree that tuberculosis of the larynx is caused by the direct invasion of the mucous membrane by the tubercle bacillus. It would seem proper therefore that every patient with a positive sputum, should be looked upon as a possible candidate for this complication. At the Otisville Sanatorium about 70 per cent. of the adult patients have or have had a positive sputum while only 25 per cent. of these have laryngeal tuberculosis. In past studies on the etiology of laryngeal tuberculosis the author has found a high frequency of occurrence of what might be considered predisposing factors; 92 per cent. had more or less obstruction or disease in the nasal passages; 80 per cent. showed a chronic pharyngitis; 60 per cent. some abnormality of the tonsils and soft palate; 98.5 per cent. gave a history of cough extending over a period from a few months to many years. The above findings are greatly in excess of the abnormalities in uncomplicated pulmonary cases. Freudenthal[10] regards these predisposing causes as capable of producing a catarrhal condition in the larynx with a consequent *locus minoris resistentiae* and forming a favorable site for the implantation of the tubercle bacillus. Therefore in order to prevent tuberculosis of the larynx we must raise the resistance of that specific organ. It thus behooves us, in addition to treating the patient's pulmonary condition, to devote the major part of our time and energy to the care of the upper part of the respiratory tract. By affording the patient free breathing space in his nose and naso-pharynx; by controlling the cough; by abating frequent colds; by avoiding direct irritants such as tobacco, the inhalation of dust, etc., we may prevent a chronic congestion of the larynx, and thus give the larynx a fighting chance and in many instances forestall an invasion by the tubercle bacillus.

At the Otisville Sanatorium we are realizing the importance of these simple measures and consequently are undertaking an active propaganda for their adoption. Every patient admitted to the Sanatorium has the upper air passages thoroughly examined. All detected abnormalities which may later have an undermining influence on the larynx are, if possible, corrected and treated. The patient is advised regarding the condition, and all measures are taken for the removal of the factors that may predispose to tuberculosis of the larynx.

Each building has the following notice posted for the information and guidance of the patient.

IMPORTANT

Patients with pulmonary tuberculosis not infrequently develop tuberculosis of the larnyx, but like tuberculosis elsewhere in the body, it can be prevented.

To prevent tuberculosis of the larnyx, patients are advised:

(1) Always to breathe through the nose. Mouth breathing is a bad habit. If you cannot breathe through your nose there is a cause which needs treatment.

(2) Refrain from abuse of voice, such as shouting, singing, and excessive talking.

(3) Cough as little as possible. Coughing irritates the throat.

(4) Patients subject to colds or sore throats can often be helped by prompt medical attention.

(5) Abstain from the use of tobacco and alcohol. These act as direct irritants to the throat.

(6) Patients having the slightest trouble in the nose or throat should consult the doctor.

If the patient should have already developed some suspicious signs of laryngeal involvement, he is carefully watched and examined at frequent intervals, and as soon as a positive diagnosis is made he is moved to the "Throat Division" where he undergoes a more intensive routine treatment.

Due to the keen interest and co-operation of the physician-in-charge, Dr. Walter L. Rathbun, the "Throat Division" has been one of the most recent developments at our sanatorium, and as far as the author knows, it is the first of its kind. In view of the fact that about 25 per cent. of our adult patients have larnygeal tuberculosis it appeared to the writer that the segregation of the laryngeal cases as strongly advocated by Dr. Wm. Ewart[11] of London, would be a very practical means for the necessary thorough supervision. It is practically impossible for one man to keep track of all the laryngeal cases when scattered among uncomplicated cases. By forming a "Throat Division" all or most of the ambulatory cases can be easily watched and cared for.

Patients in the early stage of laryngeal tuberculosis may have very slight symptoms or none at all. Ordinarily in a large institution it is the custom for patients to be subdivided regardless of the throat condition. A physician is then assigned to each division. Unless specially interested in throat work, it can readily be seen that the laryngeal condition will be inquired after only when symptoms are apparent or complained of. However, all the patients having been placed in one division under the care of the laryngologist, it is possible for him to watch the laryngeal condition even though symptoms are lacking. Furthermore the treatment is greatly facilitated when patients are seen collectively and instructed from time to time as to the seriousness of laryngeal tuberculosis and the importance of its treatment.

Patients are much more comfortable when grouped, and carry out instructions and treatment more eagerly. Each building that houses these patients is specially selected for its location. Special rules which they are expected to follow carefully, are conspicuously posted.

The following are the rules:

1. Patients with tuberculosis of the larnyx should use the voice only on the advice of the doctor. The use of an inflamed tuberculous throat almost always leads to a further progress of the disease.
2. The use of tobacco is absolutely prohibited. Tobacco acts as a direct irritant to the throat.
3. Patients should always breathe through the nose. Those that cannot do so should consult the doctor.
4. Control your cough as much as possible. Coughing irritates the throat and if excessive, some treatment may be necessary.
5. Patients sensitive to colds or sore throats should consult the doctor. Frequent colds and sore throats predispose the larynx to tuberculosis.

It is therefore obvious that by the formation of a laryngeal division with its routine and discipline, we are enabled to pursue a more careful study of this complication and to institute more effective measures for its control.

When we come to consider the actual treatment of tuberculous laryngitis, the writer does not presume to go into the great mass of detail of all methods of treatment, but will mention rather the most practical methods applicable to the average sanatorium patient.

We must consider the subject under four headings:

1 General sanatorium treatment.
2 Rest and the graduated use of voice.
3 Local measures.
4 Surgical measures.

1. *General Sanatorium Treatment.*—Every patient with tuberculosis of the larynx should, if possible, be placed in a sanatorium or hospital where institutional treatment can be carried out. The treatment of the pulmonary condition should always be of primary importance, since it would be futile to treat the larynx without endeavoring to improve the pulmonary lesion. Hygienic surroundings must be perfect, and the patients' habits well regulated. The use of tobacco and alcohol should be prohibited. Patients should be instructed to control the cough as much as possible, especially when of a dry and hacking character. If excessive, it should be treated with soothing sprays or cough sedatives.

2. *Rest and Graduated Use of the Voice.*—Vocal rest effectively applied will yield very gratifying results. Some authorities[12] in advocating vocal rest claim that it should be applied in all cases and in all stages. This routine has been almost universally employed. However, in asking a patient to keep absolutely quiet for an indefinite period, we are expecting him to accomplish the impossible. A patient is not put to bed and kept there indefinitely for the mere reason that he has pulmonary tuberculosis. We prescribe rest while he shows symptoms of activity such as hemoptysis, fever, etc., but as the activity subsides we allow a certain amount of exercise, increasing it gradually as the lesion undergoes fibrosis. The same principle applies in laryngeal tuberculosis. Dr. Edward R. Baldwin of Saranac Lake, in a personal communication writes, "After the disease (in the larynx) has become thoroughly quiescent, it is my custom to permit the use of the voice in low tones, but not to allow loud talking or laughing to any extent." He also agrees to the principle which applies both to the larynx and to the lungs in reference to the general management. Naturally, ulceration of the vocal bands requires longer rest than ulceration occurring in other parts.

The following indications have been of service to me for guidance in the application of vocal rest in laryngeal tuberculosis:

(a) A patient with an active inflammation or ulceration of part or entire larynx should be restricted to absolute rest of the voice until the acute condition subsides.

(b) After the acute condition has subsided the patient may be allowed to lip-whisper, which although not wholly is almost equivalent to vocal rest.

(c) Cases in which the lesion is taking on a chronic course and shows a

tendency to fibrosis or absorption, ordinary whispering and slight use of the voice may be permitted.

(d) Cases with chronic fibrosis and indurated lesions may be allowed the ordinary use of the voice if no discomfort be felt. *Excessive use of the voice should of course always be prohibited.*

By following the above outline we are treating the patient both on a scientific and practical basis. We can all see the impracticability of totally depriving a patient of the use of the voice for an indefinite period without any encouragement whatever to resume its use.

3. *Local Measures.*—Local measures are also very important. In an active tuberculous laryngeal condition there is always an accumulation of more or less muco-purulent secretion adhering to the minute structures of the interior of the larynx. This is especially so in the active cases where we insist on absolute rest of the voice. In these cases a warm alkaline spray followed by a spray of five per cent. menthol in oil is of great benefit. When properly used it cleanses the larynx and relieves it of much of the discomfort.

In cases with a superimposed catarrhal inflammation of the larynx, mild astringents in the form of sprays may be used.

Where fibrosis is taking place there is usually an accompanying destruction of the mucous glands of the larynx producing a laryngitis sicca. Here an oily spray at frequent intervals affords much comfort to the patient.

Many of these patients have a catarrhal inflammation of the trachea accompanying the laryngeal condition which is extremely annoying *per se*, and an intratracheal injection of a five or ten per cent. solution of menthol in oil at frequent intervals brings relief. It allays irritation, diminishes the cough, and facilitates expectoration.

Bullock[13] has had good results from the use of the formaline solution in increasing strengths applied directly to the ulcerated surface, on a laryngeal applicator. Minor[14] reports excellent results from the use of the crystalline form of iodoform. He has the patient insufflate the powder morning and night from a specially devised apparatus. Freudenthal[15] is a firm believer in the use of the orthoform emulsion made up after a formula of his own. He applies it directly to the ulcerating surface in the larynx with the purpose of putting the parts at rest through analgesia. In describing its use he says: "Such medication alone if used correctly will often produce cicatrization of an ulcer." H. H. Forbes of New York is using an ether iodoform spray with gratifying results. In addition numerous astringents and caustics have been used with varied success.

4. *Surgical Measures.*—Of the surgical measures the galvano-cautery is the procedure that is receiving more and more adherents. Thos. J. Harris of New York claims that the galvano-cautery is one of the most efficient means for destroying a tuberculous focus in the larynx and for promoting fibrosis. He also says that the value of this treatment is greatly enhanced by using it in conjunction with the Killian suspension method. Sir St. Clair Thomson[16] claims that the galvano-cautery is the best weapon that we have at present for the local treatment. It was indicated in 20.22 per cent. of 178 cases and it completed the cure in 41.60 per cent. of the cases in which it was used. R.

Pettit[17] claims that he has healed from 70 to 85 per cent. of the incipient cases of laryngeal tuberculosis, by the submucous cauterization of the diseased tissue. Robert Levy[18] says that of the various modifications of surgical measures the galvano-cautery has the most advocates, and he uses it in all forms of the disease. Wood's[19] experience with the electric cautery in laryngeal tuberculosis has led him to discontinue any other method of treatment.

More radical measures such as curetment, excision of the affected parts are practiced by Thos. J. Harris, Levy,[20] Arnoldson,[21] Freudenthal,[22] and other authorities.

For the relief of pain in laryngeal tuberculosis when local measures such as orthoform, cocain, alypin, etc. have failed, the injection of alcohol into the superior laryngeal nerve is of definitely established value. It is of interest to note that of about 500 laryngeal cases which have come under the author's care dysphagia was not of sufficient severity as to warrant any active treatment for its alleviation. This may be partially explained by the fact that at the Otisville Sanatorium 74 per cent. of the laryngeal involvements are in the incipient stage.

The foregoing discussion may be summarized as follows:

1. The prevention of tuberculous laryngitis is as important, if not more so, than its actual treatment.

2. The "Throat Division" as suggested by William Ewart[23] of London, and approved of by Dr. Robert J. Wilson, Dr. Chas. B. Slade and Dr. Walter L. Rathbun is of demonstrated value in sanatorium practice.

3. Every large tuberculosis sanatorium should have a competent resident laryngologist, and in the words of Emil Mayer[24] "We should do all we can to prevent the patients from going to sanatoria where there is no competent laryngologist to observe them."

4 The general management of tuberculous laryngitis should be the same as that of pulmonary tuberculosis. Vocal rest, although absolutely essential in acute inflammatory conditions of the larynx, may be gradually dispensed with as the lesion becomes fibrous.

5. Of the surgical measures the galvano-cautery seems to be the most practical and efficient means of treatment and every sanatorium should be equipped for its proper application.

I wish to express my gratitude to Dr. Walter L. Rathbun for his help in forming the "Throat Division" and for his many invaluable suggestions regarding the treatment.

BIBLIOGRAPHY

1. Levy, Robert: The significance of laryngeal manifestations during the course of pulmonary tuberculosis based upon a study of 650 cases. The Journal of Iowa State Medical Society, Dec. 15, 1914.
2. Thomson, St. Clair: Progressive Medicine, September, 1914, vol. xvi, No. 3. P. 29.
3. Dworetzky, J.: Etiology and prophylaxis of laryngeal tuberculosis, Annals of Otology, Rhinology and Laryngology, Dec. 1914. Vol. xxiii, No. 4. P. 835.
4. Thomson, St. Clair: Progressive Medicine, September, 1914, vol. xvi, No. 3. P. 29.
5. Brown: Osler and McRae, Modern Medicine; Prognosis of Tuberculosis. 1913, vol. i, chapter vi. P. 414.

6. Dworetzky, J.: Etiology and prophylaxis of tuberculous laryngitis, Annals of Otology, Rhinology and Laryngoogy, Dec. 1914. Vol. xxiii, No. 4. P. 837.
7. Levy, Robert: Laryngeal tuberculosis, Journal of A.M.A., May,17, 1913,vol. lx. P. 1519.
8. Bonney: Pulmonary tuberculosis and its complications. 1908. P. 526.
9. Ballenger: Diseases of nose, throat and ear. 1911. Third edition. P. 308.
10. Freudenthal: Society Proceedings of New York Academy of Medicine. Laryngoscope, January, 1915. Vol. xxv, No. 1.
11. Ewart, William: Progressive Medicine, September, 1914. Vol. xvi, No. 3. P. 28.
12. Levy, Robert: Laryngeal tuberculosis, Journal of A. M. A., May 17, 1913. Vol. lx. P. 1522.
13. Bullock: A statistical study of 100 cases of laryngeal tuberculosis treated with formaldehyde. Sixth International Congress on Tuberculosis. Vol. 1, part II. P. 1104.
14. Minor: Early changes in the larynx in pulmonary tuberculosis. National Association for the Study and Prevention of Tuberculosis, 1909–1910. P. 186.
15. Freudenthal: The management of laryngeal tuberculosis in sanatorium and private practice. Medical Record, May 30, 1914. Vol. lxxxv, No. 22. P. 974.
16. Thomson, St. Clair: Progressive Medicine. September, 1914. Vol. xvi, No. 3. P. 29.
17. Pettit, R.: N. Y. Medical Journal, January 18, 1913. Vol. xcvii. P. 122.
18. Levy, Robert: Laryngeal Tuberculosis, Journal of A. M. A., May 17, 1913. Vol. lx. P. 1523.
19. Wood: Progressive Medicine. March, 1914. Vol. xvi, No. 1. P. 349.
20. Levy, Robert: Laryngeal Tuberculosis, Journal of A. M. A., May 17, 1913. Vol. lx. P. 1523.
21. Arnoldson: Progressive Medicine. March, 1914. Vol. xvi, No. 1. P. 349.
22. Freudenthal: Prognosis and treatment of laryngeal tuberculosis. Laryngoscope, July, 1912. Vol. xxii. P. 971.
23. Ewart, William: Progressive Medicine. September, 1914. Vol. xvi, No. 3. P. 28.
24. Mayer, Emil: Society Proceedings of New York Academy of Medicine, Laryngoscope, January, 1915. Vol. xxv, No. 1.

DISCUSSION ON PAPER BY DR. DWORETZKY

Dr. Walter C. Klotz, Los Angeles: The percentage quoted by Dr. Dworetzky—25 per cent. seems rather high to me. In my experience at the Barlow Sanatorium there were 39 cases of tuberculous laryngitis, out of a total of 759 cases, that is about 5 per cent.

PANCREATIC FERMENT DETERMINATION IN PULMONARY TUBERCULOSIS

By Ethan A. Gray, M.D., and Olga Pickmann, M.D.
Chicago

Much attention has been given to the diet of the tuberculous. Quality and daily quantity have received much consideration. Digestive disturbances, as expressed by anorexia, vomiting, dyspepsia (gastric distress) intestinal indigestion, and diarrhoea have long been recognized as forming parts of the general picture in tuberculosis.

In the absence of gross signs of digestive derangement, it is common to see a patient eat well but fail to gain in weight. It is common to see a tuberculous patient refuse all food, especially when the system is under the influence of toxins; this may be in the early febrile period as well as in the terminal stage.

Again, we see patients with good appetites and high temperatures—far advanced patients, with no appetites and low temperatures.

Studying over 200 cases we found that, as is well known, our patients preferred vegetables and starches and that they consumed foods of these types much in excess of body needs and their ability to digest. We found that starch was passed in the feces, chemically unchanged—not alone in recognizable particles, as, for example, potato, but also in the fecal mass, to be determined only by chemical test. In other cases meat was recovered, practically undigested, in the stools of poor eaters, and in those of hearty eaters as well.

We also noted frequent stomach and bowel disorders in these cases. (Note—None of our patients has ever been urged to eat.)

It soon became evident that actual digestive aberration was a factor in the problem, especially after a perusal of Permin's table which shows anacidity and subacidity in the consumptive as follows:

First stage 23 per cent. of cases.

Second stage 34 per cent. of cases.

Third stage, 47 per cent. of cases.

Terminal, 75 per cent. of cases. (Permin, *International Beitraege Z. Path. u. Ther. d. Ernaehrungs*, Stoerungen, 1910).

However, as many of our cases presented no demonstrable signs of gastric origin, we began the closer examination of the feces with a view to study of the pancreatic secretions, amylopsin and trypsin.

Our first series of cases consisted of 24 moderately advanced and incipient cases and 139 far advanced cases. Among the latter were some terminal cases. Trypsin was determined by the Fuld-Gross method, amylopsin by the Wohlgemuth method, preceded by calomel and Seidlitz catharsis. The sec-

ond or third stool was taken for examination. No attempt was made in this series to estimate or control the intake of foods. This comes later.

The Fuld-Gross trypsin determination method depends on the fact that casein, undigested, is precipitated by acetic alcohol, while digested casein is not so changed. The estimation is made in units, one unit representing the ability of 1 cc. stool filtrate to transform (or digest) 1 cc. of starch or casein solution.

Example.—If a tube containing 1 cc. of $\frac{1}{1000}$ fecal dilution is the greatest dilution which can digest 5 cc. starch or casein solution, then 1 cc. of undiluted fecal filtrate would be able to digest 5000 cc. starch or casein solution. This represents 5000 units. The average normal reading is from 500 to 1000.

To make the test, fecal solutions 1–10, 1–100 and 1–1000 are made and poured into 9 test tubes as follows: First three: 1–10 sol. 2 cc., 1 cc. 0.5 cc. Second three tubes: 1–100, 2 cc., 1 cc., 0.5 cc. Third three tubes 1–1000, 2 cc., 1 cc., 0.5 cc.

Now add to each tube 5 cc. starch solution 1 per cent., or casein solution 1–1000. The tube showing digestion, i.e., no reaction, by the weakest fecal solution after 24 hours incubation, is taken as the index of digestion. The casein reagent is, as previously indicated, acetic alcohol (1 per cent. acid acetic may be used); the starch reagent is Lugol's solution.

A large number of the cases examined showed no free amylopsin. This must not be taken to mean that no amylopsin had been secreted, but that all secreted amylopsin had been neutralized by the starch excess. (See Chart II, case 4, Chart III, case 6, Chart IV, case 9, Chart V, case 7 and 3. We should, therefore, disregard zero amylopsin readings until we estimate the starch intake. Some cases which showed amylopsin 25–50 had almost no intake of food, hence, the reading possessed no value. See Chart I, case 2, Chart V, case 7. More work remains to be done on amylopsin in this connection.

Trypsin indices are much higher and seem to possess a much greater importance. Relatively few trypsin zero readings were taken but, where present, often took on a grave significance. Again as starch excess in diet has its effect on amylopsin determination, so has protein excess a neutralizing influence on the trypsin index.

We found that patients with anorexia and diarrhoea had high trypsin readings. As we see it, there was no neutralization of the small amount of trypsin secreted. See Chart I, case 2. Patients having good appetites and weight gains usually had high or increasing trypsin readings Chart, III, case 6, Chart IV, case 9. High trypsin readings are seen in terminal cases. Here the amount of Trypsin is small but it remains free in the feces. See Chart I, case 1.

Some patients with low initial trypsin indices were put at rest, kept on liquids or light diet until appetite returned. Directly improvement in symptoms appeared, increase in trypsin occurred. Chart III, case 6. Following out the rest idea, trypsin indices were taken after pneumothorax. They were always found to be higher, Chart I, case 3, Chart III, case 8, Chart IV, case 9.

We now took a second series of over 60 cases and controlled the protein intake. It was discovered that, while under general diet, patients would show a high trypsin reading, after definite amounts of meat and eggs had been given as, 100 gm., 250 gm., 300 gm., that the index rapidly dropped. The explanation for this is that, on "general diet" the patient avoided his protein, hence his high trypsin index. On graded protein diet he neutralized, even with small amounts, his trypsin. The results often showed almost an atrypsia, Chart II, case 4.

In one case with anorexia, the trypsin index was low, T. 100, amylopsin, however, was 700, protein was stopped and amylaceous diet ordered. Improvement was marked and, afterwards, accelerated by a pneumothorax. Incidentally we present readings on one case of diabetes with tuberculosis, Chart III, case 5.

We have also examined salivas, but the results gained are so variable as to preclude, for the present, any codification.

CHARTS AND LEGENDA

These charts show trypsin and amylopsin to be reduced in the tuberculous under influence of toxins. In favorable cases, disappearance of toxin is accompanied by increase of trypsin. Amylopsin is less frequently found because of the excess of starch found in the feces of the tuberculous; the ferment is neutralized by this excess. Trypsin indices may be large in presence of anorexia and gastro-intestinal complications by lack of protein neutralization; also, because of actual improvement. Constantly low trypsin index is present in failing cases. Rising index with good appetite is favorable.

FULD-GROSS AND WOHLGEMUTH METHODS USED

I

1. Frida S. Far advanced.
   October 30, 1914, A. 10,000, T. 0.
   Absolute anorexia, death.
2. Percy K. Terminal.
   October 25, 1914, A. 100, T. 500, diarrhoea.
   December 31, 1914, A. 25, T. 10,000, death.
3. May S. Far advanced.
   May 30, 1914, A. 700, T. 100, weight 118½, anorexia.
   July 25, 1914, Pn-thorax, Art., weight 118¾.
   October 15, 1914, A. 25, T. 5000, weight 129¼.
   October 29, 1914, A. 50, T. 10,000, weight 135. Convalescent.

LEGEND—CHART I

Case 1.—"Absolute anorexia." No food intake, hence no neutralization of ferments. Therefore, high amylopsin reading. "T. 0." indicates no trypsin demonstrable.

Case 2.—"Diarrhoea" (tuberculous); diet was fluid, chiefly; some starch, no proteid, hence high trypsin readings, due to non-neutralization.

Case 3.—"Anorexia," intake, starches, no proteid. After pneumo-thorax, artificialis, appetite for meat increased, weight increased, trypsin increased. Here, lung collapse reduced toxemia, and, thus, freed the digestive system from the influence of infection.

II

4. Margaret S. Far advanced.
   March 2, 1915, A. 100, T. 100, weight 93½.
   March 5, 1915, Pn-thorax (bilateral and extensive disease).
   April 15, 1915, A. 0, T. 5000, general diet.
   April 17, 1915, A. 0, T. 100, gm. 100 protein.
   April 19, 1915, A. 0, T. 25, gm. 250 protein.
   April 21, 1915, A. 0, T. 0, gm. 300 protein, weight 89 lbs. Losing ground, daily fever.
5. William S. Far advanced. Diabetes.
   October 17, 1914, A. 50, T. 0, proteid diet.
   Jan. 12, 1915, A. 0, T. 100. Mixed diet, death.

LEGEND—CHART II

CASE 4.—Far advanced, bilateral, febrile case; appetite fair, worse lung collapsed to reduce septic absorption; fever dropped somewhat, cough and sputum ceased. "April 15, A. 0, T. 500," on general diet which was chiefly starch; very little protein. In quantitative test, 100 gm. protein reduced the trypsin reading to 100 units, 250 gm. to 25 units, while 300 gm. entirely neutralized the secreted trypsin. Patient losing ground, febrile.

CASE 5.—Diabetes with tbc. Proteid diet. No trypsin, wasting. "A 50" Starches given, weight gain at once. General improvement until influenza, brocho-pneumonia, death.

III

6. Hannah S. Far advanced.
   December 1, 1914, weight 107¾.
   December 12, 1914, A. 100, T. 0.
   January 7, 1915, A. 0, T. 100, weight 119.
   January 13, 1915, pn-thorax.
   February 5, 1915, A. 0, T. 0, weight 120, appetite good.
   March 3, 1915, A. 0, T. 250, weight 122.
   April 24, 1915, A. 100, T. 1000, gm. 100, protein.
   April 26, 1915, A. 0, T. 5000, gm. 250, protein.
   April 28, 1915, A. 0, T. 10,000, gm. 300, protein. General condition excellent.

IV

9. Howard C. Far advanced. Weight 122. Fever. Anorexia.
   January 5, 1915, A. 0, T. 1000, weight 117, gastric distress.
   March 22, 1915, A. 0, T. 100, weight 116¾, no fever.
   April 23, 1915, pn-thorax, weight 116¾, fever.
   May 1, 1915, A. 0, T. 250, weight 117, general diet.
   May 2, 1915, A. 0, T, 10,000, gm. 100, protein.
   May 3, 1915, A. 0, T. 250, gm. 250, protein.
   May 5, 1915, A. 0, T. 1000, gm. 300, protein.
   No fever since pn-th. weight 125, appetite good.

LEGEND—CHARTS III AND IV

CASE 6.—Admitted to hospital; weight 107¾, no trypsin, bed rest one month, "T. 100;" weight gain 11 lbs., appetite better. Trypsin index steadily rose after pn-th to 10,000 units. General condition excellent.

CASE 9.—Wasted, febrile, dyspeptic. Four months bed-rest, little improvement; then, pn-thorax on worse lung. Almost instant change for better; gastric symptoms disappeared. Trypsin index May 1, 250 units. May 2, proteid diet reduced to gm. 100, result trypsin 10,000. With 300 gm. protein, May 5, trypsin reads 1000 units, or double the normal.

V

7. Hugh C. Far advanced.
   November 14, 1914, A. 25, T. 50.
   January 5, 1915, A. 0, T. 25.
   March 6, 1915, A. 0, T. 50, bedfast.
8. Hannah P. Far advanced.
   November 20, 1914, A. 100, T. 250, weight 136¾.
   December 23, 1914, A. 0, T. 250, weight 137¼.
   February 1, 1915, A. 0, T. 50, weight 134¼.
   February 19, 1915, pn-thorax.
   March 6, 1915, A. 0, T. 0, weight 135, invalid.

LEGEND—CHART V

CASES 7 and 8.—These cases both show low trypsin indices—both are far advanced. Both have extensive lung involvement. Case 7 has been for many months confined to bed.

Case 8 has had fever from time to time—is now invalid. These constantly low trypsin readings are the rule in far advanced cases not presenting any gastric or intestinal disturbance.

VI

10. Vivian K. Incipient, weight 106.
January 23, 1915, A. 0, T. 0, weight 108.
February 20, 1915, A. 0, T. 250, weight 110½.
11. Violet I. Incipient.
February 10, 1915, A. 0, T. 0, stomach pain after eating.
March 10, 1915, A. 50, T. 25, weight 132.
May 20, 1915. Weight 130.
Generally better. Eats well.

LEGEND—CHART VI

CASES 10 AND 11. Both are closed cases, with poor appetite and poor digestion; prolonged bed-rest brought improvement in both.

CONCLUSIONS

1. We conclude that pancreatic secretions are seriously diminished by toxins of tuberculosis, in any stage.

2. Rest (bed rest or pneumothorax) by reducing the production of toxins, aids in the return to a normal of these pancreatic secretions.

3. Persistently low trypsin readings are prognostically bad.

4. Low amylopsin values are of lesser prognostic importance.

5. All interpretations of indices must be made with due consideration for anorexia, overeating, diarrhoea.

We wish to express our thanks to Miss Rose Pribyl, laboratory assistant, for her great aid in carrying out our studies.

DISCUSSION ON PAPER BY DRS. GRAY AND PICKMANN

Dr. Alfred Meyer, New York: This is an exceptional chemical paper. I hope it has proved as instructive to the meeting as it has to me.

Dr. George Mannheimer, New York: So little has been written on this subject that every contribution is welcome. I think it would be highly desirable to study the pancreatic ferments also at first hand, e.g., by the duodenal tube. I have no doubt that the average patient could stand the tube for the necessary length of time. But we should also study the internal secretions. It is not mere accident that one person develops tuberculosis and other infectious diseases and another person does not. The endocrine glands have a great deal to do with this susceptibility or immunity. This phase of the subject is more open to the clinician than to the laboratory man.

Dr. Meyer: I have heard Dr. Mannheimer on the subject of the ductless glands. For many years I have noticed in cases of pulmonary tuberculosis what I think are enlarged thyroid glands. Perhaps there is a relation between the predisposition to tuberculosis and the thyroid gland and its secretions. Patients ordinarily use thyroid preparations to reduce weight. I saw one striking case where a patient gained hugely in weight with the administration of thyroid. That has not been explained and so far as I know has not been seen before. In the sociological section this morning one speaker laid stress on "predisposition" in tuberculosis. That may be a chemical process, possibly a function of one or more of the ductless glands being involved.

Dr. John Ritter, Chicago: This able paper by Dr. Gray has interested us very much. I would like to ask a question. In the ingestion of pancreatic secretion by way of the stomach, if it is destroyed; would it be advisable to give a rectal injection of pancreatic extract? Would that inhibit the tuberculous process in any way?

Dr. Gray: The tuberculous process causes, or at any rate influences pancreatic secretions, it is not a result of pancreatic disturbance. We do have achylia gastrica in all of these cases. I have not gone into the question of examination by duodenal tube. I have not seen until recently any tube that I would care to use. One might start a hemorrhage from blood vessels lying thinly protected in ulceration areas.

In some autopsies we have attempted to hurry things along and have examined the pancreas promptly. We have, however, never found anything pathological which would throw any light on this subject. Pancreatic extract I have tried, but may be it was destroyed in the stomach. With a capsule that will pass undigested through the stomach it might be of use. I am glad to note that some of my colleagues believe in limiting the diet of the consumptive. We reduce the toxins by rest and by pneumothorax, and we should not allow the patient to get beyond his digestive capacity. Much damage is done by overfeeding, much also by the excessive intake of the re-awakened appetite.

When a patient has overeaten and has thus produced digestive derangement, with anorexia, diarrhoea perhaps, I recommend "ricini cocktails" and complete starvation for two days and then light diet and the patient soon gets back to normal. Most of these patients are short of digestive ferments and therein lies the difficulty.

ESSENTIAL POINTS IN THE EARLY DETERMINATION OF TUBERCLE

By Frederick Slyfield, M.D.
Seattle

There is no other disease so easily and profitable treated as tuberculosis—in the beginning. Assuming that we should be permitted to carry out the treatment as we desire, then it is true that there is a time in the history of almost every case of phthisis when it can be easily and completely cured.

Why is it then, that most consumptives die, just as they have been dying for hundreds of years? There are some very definite reasons for this unfortunate condition. First, the patient commonly fails to consult the physician until the disease is well established. When the onset is insidious, as is so frequently the case, the patient becomes gradually accustomed to his changing condition and does not become alarmed until it materially interferes with his work or pleasure. When the onset is apparently sudden as in hemorrhage, acute pleurisy or severe acute bronchitis or laryngitis, the victim is temporarily alarmed but forgets it with the cessation of these important symptoms. There is also a group of individuals who fearing they have the disease, refuse to make certain about it because the knowledge is distasteful, or because it will necessitate a change in their mode of living. We have another problem to deal with in this connection and probably we shall always have it to fight, and that is the absurd, pernicious, yet ever mulitplying non-medical methods of treating disease. None knows so well as the specialist how little is known about tuberculosis. None knows so well as he how helpless we are in the care of advanced cases.

Yet we are always retarded in our conscientious efforts by men and women who think all physicians are grafters; who know nothing about the human anatomy, who have never studied disease except in the occasional perusal of the family "doctor book," or who altogether decline to recognize the existence of physical ailments. We are continually baffled in our sincere purpose by people who know infinitely less than we do, but who think they know it all.

Now, another reason for the present status of tuberculosis. All over the country, societies, organizations of various kinds, and individuals are advising suspicious cases to consult their doctors. What happens to an incipient case when he goes to his family physician? Check up your experiences. What happened to that man who came to you with confidence in your ability and in your desire to keep the profession above reproach? Did your perseverance in applying all the known methods of pulmonary diagnosis, enable that man to regain his health? Or did you after a moment's conversation write a prescription for an iron compound?

Gentlemen, without any desire to arraign the medical profession, and yet without fear of retaliation, I say that one of the greatest drawbacks in dealing with the tuberculosis problem, and one of the prime reasons why the sanatoria, with all their admirable work, are not accomplishing infinitely more, is the fact that the family physician cannot or does not recognize the disease.

With these things in mind I have endeavored to present in this brief paper, some of the points which should enable us to catch these cases. I have intentionally omitted many things. This is a mere outline prepared exclusively from personal experience.

I. GENERAL SYMPTOMS

a. Hoarseness.—When a patient complains of husky voice or of an easily tired voice or of aphonia, and the condition presists more than two weeks regardless of various forms of treatment, then it is time to suspect tuberculosis. If you can eliminate syphilis, then chronic laryngitis is nearly always tuberculosis. Furthermore, a laryngitis which does readily clear up is often associated with tuberculosis. Simple laryngeal catarrh is very common in tuberculosis of the lungs.

b. Cough.—It has been recognized from the time of Hypocrites that one of the most constant and presistent symptoms of tuberculosis is cough. Yet many a tuberculous individual is permitted to cough for months before a diagnosis is made. And in the meantime probably nothing has been done, further than the administration of numerous cough syrups. It is a symptom so easily overlooked because everybody coughs, but we owe it to our patient to find the reason for a continued cough. The same is true of a "cold" which refuses to clear up.

c. Gastro-intestinal disturbances.—These are so varied in type that I shall not attempt to describe any particular variety. Suffice it to say that persistent indigestion or loss of appetite, which does not improve with the ordinary treatment, very frequently accompanies tuberculosis. Numerous cases have been referred to me which have suffered for a long time with what the patient calls "stomach trouble." They have been diagnozed everything from appendicitis to typhoid fever until finally the lung condition reveals the seat of the trouble.

d. Loss of weight.—The importance of this suggestive feature has been so far overlooked that a great many advanced cases of phthisis have never been weighed since the trouble began. A patient, complaining of any kind of chronic disturbance, should be weighed regularly. Loss of weight is a very early symptom of consumption, and during the early course of the disease a progressive diminution in flesh is a characteristic feature. Every patient coming to my office is asked: "What do you consider your normal weight, and how much did you weigh six months ago?" Then we put him on the scales and compare with his figures. Subsequently, the patient is weighed every time he comes to the office. In the case of a child, one must avoid the error of believing there is no loss when the patient's weight remains the same, for the normal child probably should have gained ten pounds or more. In such cases there has really been a loss.

e. Night sweats.—I speak of perspiration here, not because it will help you make an early diagnosis, since it is not commonly present until later, but because of the fact that we are often tempted to rule out the diagnosis of tuberculosis because of the absence of this proverbial symptom. In short, nightsweats generally bespeak an advanced progressive lesion.

f. Hemoptysis.—Hemorrhage from the lungs is always tuberculosis. This assumption fails about once in a thousand cases. Therefore it is safe to treat the patient as a consumptive whenever we see hemoptysis. All physicians know this fact. Then why should we mention it here? Because nearly 50 per cent. of our hemorrhage cases at the Pulmonary Hospital, have been told by their physicians, that the trouble was "irritation of the larynx," "bleeding from throat," "gastric ulcer," or that everybody spits blood occasionally. Such unfortunate and unpardonable errors lead the victim into an advanced condition before he can begin the proper treatment.

g. Pleurisy.—The more I see of pleurisy, the more convinced I become that practically every case is tuberculous, and when it is complicated by effusion the diagnosis is almost confirmed. I say "almost" to leave a loophole for those rare cases which may possibly be due to some other agent. Pleurisy is not always followed by other manifestations of the disease, but this is not a contradiction. Most of our patients at the sanatorium give a history of early pleural irritation, yet in some of them many months, or even years, have elapsed before further trouble has brought them to the physician. The important point about pleurisy is that it must be looked upon as a timely warning. The patient must be most carefully watched for further developments, and in a large percentage of cases our diligence will be rewarded by the satisfaction of making a definite diagnosis of tuberculosis.

h. Exhaustion.—A patient, who is living about as he has been for years, observes that for the last eight or ten months he is easily tired; that he has not the ambition which previously characterized his activity; that he is short of wind; which, combined with loss of weight, worry him and bring him to the doctor. Now what is the matter with him? He has a wasting disease. Is it cancer, animal parasite, syphilis, diabetes, Bright's or tuberculosis? This man must NOT be dismissed with a tonic and a laugh. There is something wrong with him, and there is something criminally wrong with us if we do not go to the limit to find it.

i. Prolonged convalescence from other diseases.—I mention this only to call attention to the well known fact that during the period of devitalization following an operation or an acute illness, the tubercle bacillus grasps the opportunity to stir up trouble. Then let us think of this when a patient's recovery is unaccountably slow.

j. Pulse.—The pulse rate is practically always increased. This is generally assumed to be the result of the beginning toxemia. Doubtless this is correct. I believe, however, that another reason lies in the fact that with the gradual, progressive, perhaps unnoticed, loss of strength, a gradual increase in general muscular effort is necessary to the movements of the body, and voluntary exertion is normally accompanied by an accellerated heartbeat.

k. Fever.—The temperature curve in early phthisis is fairly characteristic. Subnormal in the morning, normal or nearly so at noon, slightly elevated in the middle of the afternoon, and about normal at night. This is vitally important. You may see a patient every day for two months at ten o'clock in the morning and, finding his temperature normal, discharge him, whereas, if you should take it at 4.00 p.m., you would find 99.2° or 99.4°. The authors of some textbooks recommend recording the temperature every evening at 7 o'clock in order to determine the presence of fever, stating that at that time it is at its maximum. There is something wrong here. I do not mean to imply that this is incorrect; I mean to state definitely that such information is erroneous. At the Sanatorium we record the temperature at 8.00 a.m., 12.00 noon, 4.00 p.m., and 8.00 p.m., and we have learned not only that the 4.00 o'clock temperature is higher than the evening elevation, but also that at 8.00 p.m., it often reaches the minimum for twenty-four hours. The use of the clincical thermometer is a procedure, the marked simplicity of which has resulted in its total neglect by many. In a recent article by Dr. Hoyt E. Dearholt, of the Wisconsin State Sanatorium, at Wales, he points out the interesting fact that of the tuberculous individuals who finally reached the sanatorium, seventy-two per cent. had never had their temperatures taken. We must not only take the temperature, and thereby determine the presence or absence of fever, but having discovered a slight daily elevation, we must *find the cause.* "There's a reason" for 99° every day. We must satisfy ourselves as to the cause of such elevation. We must bind ourselves down to the determination of the reason for it. As physicians, do we not turn away many a patient without settling this point?

l. Sputum.—Gentlemen, the important thing about the sputum is *not* that it contains tubercle bacilli, but that very often in the presence of well developed tuberculosis these organisms cannot be found. Why is this the important point? Because we place too much confidence in a negative sputum. A positive sputum is conclusive evidence of pulmonary tuberculosis, but the apparent absence of the bacilli means absolutely nothing. It does not even suggest freedom from the disease. I emphasize this because so many of *us* and nearly all of our patients are inclined to be completely satisfied with a negative sputum. We have reason to believe that when the organisms appear in the expectoration, there has been considerable destruction of lung tissue; that they are not liberated until the pulmonary cells begin to disintegrate. There must be a time in the history of every case in the beginning when the disease is actively progressing, without tubercle bacilli in the sputum. Diligence in running down other symptoms will obviate the need of the microscope here. If we are to withhold the diagnosis until the microscope reveals the germs, then we must content ourselves with second stage cases.

m. Tuberculin.—This is a very useful test, but there are two great objections to its use. First, like the examination of the sputum or the use of the thermometer, it is so easy that there is danger of retrogression in physical diagnosis. If you have a suspicious case, do you give him a tuberculin test, or do you auscult the chest? Second, it is not absolutely reliable, and our interpretation

is apt to be fallacious. I am in the habit of using Koch's old tuberculin for this purpose, commonly using the subcutaneous injection of 1 mgm. This will often produce an intense local hyperemia, accompanied by swelling, redness, and pain, a rise in temperature, and a slight temporary disturbance in the focal lesion.

n. x-ray.—From personal experience with *x*-ray, I can say nothing; but experts in this line believe they can detect lung changes earlier than they can be discovered by physica' examination. Certainly we should solicit the aid of the Roentgenologist whenever doubt exists.

II. PHYSICAL SIGNS

a. Inspection.—Does not reveal much in early cases. This procedure does not help us much in early tuberculosis, since there is usually considerable alteration in the lung itself before any external changes are visible. There may be slight flattening of the chest over the affected area. This is best determined by standing behind the patient and looking down over his shoulders, comparing the two sides. This will also bring out differences in expansion of the two lungs and thereby give us a clue to the location of the pathology. By looking at the patient directly from the front or back, we can frequently observe a slight difference in the excursion of the ribs and in the elevation of the shoulder. Again, inspection often reveals retraction of the skin around the clavicle on the side of involvement, and sometimes the whole apical region is apparently retracted. But it must be remembered that an advanced case sometimes gives the outward appearance of a perfectly healthy individual. Therefore, we must avoid joking a patient about his fear of illness when he looks so well.

b. Palpitation.—Tactile fremitus may be felt over the affected spot in a majority of cases. Place the tips of the fingers and sometimes the entire hand on one side of the chest and ask the patient to speak aloud. Greater vibration will be felt by the skilful fingers on the diseased side. I have the patient say the word "MINIMUM" very slowly, because I have frequently thought that I get better vibration with "m" and "n" than with other letters.

c. Percussion.—Generally, the earliest change to be detected by percussion is a slightly raised pitch. This was recognized by Austin Flint, in 1886, and has been thoroughly verified by Richard Cabot. A slightly higher tone to soft percussion is very suggestive of beginning congestion. Again, the part which is undergoing infiltration is very likely to give a dull note as compared with the normal. As the condition advances, this becomes very prominent, so much so that sometimes the whole side of the chest sounds dead and airless.

d. Auscultation.—This, to me, is by far the most useful, and therefore the most logical means we have of determining the nature of the trouble. By the use of the stethoscope we may learn a great deal even in relatively early cases. Before commenting on the peculiarity of the sounds to be looked for, we must give attention to the normal differences existing be-

tween the two apices. Normally, the breath sounds at the right apex are somewhat more resonant than those at the left, because of the trachea being nearer the right apex, and because the right bronchus is slightly higher than the left. Both of these anatomical differences bring a hollow viscus nearer the right apex than the left, and thereby lend resonance to it. Now, what do we find in the chest with the stethoscope? First, let me impress upon you this vital truth. You will pass up nearly every incipient case unless you observe the following rules. We positively must have a room which is absolutely quiet. The average city office is far too noisy in which to detect the faint change in breath sounds that occurs in the easily curable stage. The clothing above the waist must be entirely removed. I fear this requisite is too frequently omitted, since so many patients who have seen several physicians are entirely unprepared to remove their clothing. Most of them simply open the shirt, often omitting even the removal of the collar, and very few expose the skin until the request is repeated. The physician and the patient must both be comfortable. If the patient is sitting in a strained attitude the roar of muscles will confuse your findings. Furthermore, he will not thus retain a quiet position more than a few moments. Having secured a good instrument, preferably one with a large bowl, place it firmly over the seats of election. That is, in front, immediately below the junction of the first and second thirds of the clavicle; and behind, the region about the inner end of the scapular spine. This latter includes the usual site of tubercle in the upper lobe as well as the apex of the lower lobe. What do we hear? Diminution of the normal respiratory murmur. Very fine crepitant rales, often brought out only after voluntary coughing and at the very summit of the deep inspiration following. A single click at the summit of inspiration should be tested again and again, and if it persists it is of the utmost importance.

e. Increase in the conduction of the whispered voice.—This feature, which is so prominent in advanced cases that a child could detect the difference, is also very useful in the earlier stage. The presence of a tubercle or a group of tubercles with their surrounding hyperemia, diminishes the air space in that particular portion of the lung. It approaches consolidation, and is, therefore, a better conductor of sound. When the patient whispers "one, two, three," the sound is transmitted to the ear more distinctly through the infiltrated area than normally. Whenever we find the whispered voice sounds intensified, we can consider that the cause of the patient's decline is pulmonary tuberculosis, and in the great majority of cases this assumption will be confirmed by other findings.

DISCUSSION ON PAPER BY DR. SLYFIELD

Dr. William Charles White, Pittsburgh: I wish to raise a question of caution in our public utterances. Dr. Slyfield has said that early cases of tuberculosis are all curable. This is a frequent statement, but not true. Some early cases in point of time (which is the only conception the laity have of early) are doomed to fatality from the beginning.

I believe that all primary tuberculosis is lymph. glandular. In situation the pulmonary lesion and other extensive lesions are secondary and their extent is determined by the amount of the softening and point of rupture of the primary gland lesion. The location of the gland in the body and the size of the vessel it opens into determine the position of the secondary lesion. If the softening of the gland be large and the vessel a larger pulmonary vein, we will have a fatal case from the beginning, or if a larger pulmonary artery is opened we may have a tuberculous pneumonia of great severity so that I feel we should be very guarded in our statements and consider carefully what the public understands when we speak of early tuberculosis.

This is but a question of caution not of criticism of Dr. Slyfield's excellent paper.

Dr. Gerald B. Webb, Colorado Springs: I would like to congratulate Dr. Slyfield on the title of his paper. I think the doctor meant to bring out the point of early recognition. I quite agree with him as to laboratory findings. Negative laboratory tests and negative *x*-rays or tuberculin tests mean nothing. I believe that the clinician can often detect lung changes before the *x*-ray. I would like to emphasize the pulse rate. It is so often found accelerated in early tuberculosis.

Dr. David A. Stewart, Ninette, Man.: I wish to express approval of what Dr. White has said. Anyone who has had a fairly large experience among tuberculous cases knows that the average practitioner "falls down" even oftener in prognosis than in diagnosis. Greater judgment is required in determining the type of case and probable outcome than in diagnosis. There seem to me to be four types of cases: (a) those who will achieve some sort of recovery without knowing they have been sick; (b) those who, with some small change in environment will recover easily, (c) those who, with prolonged treatment, that is, with definitely "taking the cure" will recover, and (d) those who will not recover, however treated. The reader of the paper had a good deal to say about late diagnosis, with its disastrous results. In the Sanatorium I have charge of we have done something to get the general practitioner interested in tuberculosis. Though we are 140 miles from the medical school, we arrange that the graduating students shall spend two weeks each with us, and also arrange with the Winnipeg General Hospital, which is practically the college hospital, to have each one of its internes spend a month as second assistant. We also invite physicians to visit us and we have had physicians and students helping or visiting every week of the past two years. This has already had a marked effect on the diagnosis and general understanding of tuberculosis in our district.

Dr. Edward O. Otis, Boston: It has been my lot to teach medical students for a number of years. I try to give them the fundamentals of early tuberculosis. The best place to do this in my opinion is the t.b. dispensary. There you get all kinds of cases. The diagnosis must be first made there. There is also the other side to the story. I have had over enthusiastic students and assistants and have had to correct their diagnosis. It is a serious matter to make a diagnosis of tuberculosis, when active clinical tuberculosis does not exist. If you remove a man from his regular habits or occupation on a

mistaken diagnosis you are doing great harm. I teach my students to study the symptoms most carefully, and not make their diagnosis on physical signs alone, as they are tempted to do.

Dr. E. M. Sala, Rock Island, Ill.: There is one point in regard to temperature,—I believe axillary temperature is more reliable than by mouth. I had a patient whose temperature for two weeks registered normal. He felt hot to me and the temperature, taken under the arm, was 102. I followed this out in many other cases and find the axillary temperature is a surer guide. The most correct is rectal.

Dr. John Ritter, Chicago: I wish to state that a negative sputum does not mean that an individual has not got tuberculosis, but before you find bacilli you find something that is definite and distinct and that is the lymphocytic picture. I am quite sure that where you find a predominance of small lymphocytes in the sputum there tubercle bacilli will soon appear. In some specimens of sputum I have found a single bacillus, after repeated examinations, but none after that, and sometimes no bacilli, but at all a typical lymphocytic picture, but oft repeated examination will finally determine the presence of the bacillus.

NON-TUBERCULOUS LESIONS OF THE LUNG

(DIPHTHERIA BACILLUS AND LOBAR AVIRULENT COCCUS INFECTIONS)*

By William Charles White, M.D.

Pittsburgh

Every man sooner or later becomes interested in stock taking his cases. I find, as many before me, that one of the most interesting groups in the series of admissions to a tuberculosis hospital is the non-tuberculous group. I mean the cases that have been diagnosed tuberculosis, which more careful study prove to be non-tuberculous.

All of these cases have some one or more features which induce the examining physician to make a diagnosis of tuberculosis.

In our own institution a non-tuberculous lung affection is welcome as the university season is given over wholly to teaching, and these cases add greatly to the success of the year's work.

I do not wish to present here, all the conditions belonging to such a classification, because we have not encountered a number of the conditions reported by others, some of which like streptothrix are more or less regional in distribution. I trust, however, these will be brought out in the discussion of this paper.

I omit also cases of doubtful signs of early tuberculosis.

Our own cases may be grouped as follows:

1st, diphtheria of the lung, 2 cases, 1 doubtful case.

2d, tumor of the lung, 5 cases (cancer).

3d, bronchiectasis, 5 cases.

4th, abscess of the lung, 5 cases.

5th, avirulent lobar coccus infections, 13 cases.

We have seen no streptothrix; curiously also no syphilis of the lung although we have always had it in mind and the Wasserman test is a routine procedure in undetermined cases.

If we exclude the tumor group the two symptoms on which diagnosis was made were cough and sputum. In the tumor group cough and hemorrhage were the predominant symptoms.

Groups 2, 3 and 4, I think may be diagnosed at once in the dispensary by history symptoms and physical examination. Much attention has been given to them by other observers and the literature is rich in reports of such cases so that I will not include them in this paper. This leaves us groups 1 and 2 to consider, that is the infections with the diphtheria bacillus and with avirulent members of the coccus group.

* From the R. B. Mellon Laboratory of the Tuberculosis League of Pittsburgh.

Sputum examinations are so often made with the eye fixed on the crimson dress of the tubercle bacillus that all other information from the slide is lost. Laboratory reports are often positive or negative and end there. Since our experience with the following cases we have been more specific in our instructions to the laboratory, asking for specific knowledge as to the presence or absence of other organisms than the tubercle bacillus.

DIPHTHERIA OF THE LUNG

M.W. Age 18—schoolboy. No previous illness. Took sick suddenly on October 15, with cough and sputum. In the next few days he had a small amount of blood in the sputum twice (2 to 5 c.c.). The cough and sputum continued undiminished up to the time of his entrance to this hospital 3 months later, January 15.

At this time he was found to be a well nourished boy with no signs of illness except the following: Dullness, increased vocal fremitus, increased intensity of breath sounds, and rales of varying character confined to the middle lobe of the lung on the right side; frequent cough, and about 60 c.c. daily of thick yellow sputum. The sputum on examination was negative for tubercle bacillus. After some days search for this the pathologist A. M. Gammon called attention to the constant abundant presence of diphtheria bacilli in the sputum. This fact was verified by blood serum culture. The throat culture was negative for diphtheria bacillus.

We were induced to give 5000 units of diphtheria antitoxin. In the next 24 hours the sputum increased but the diphtheria bacillus disappeared. At the end of 48 hours the sputum which had persisted unchanged for $3\frac{1}{2}$ months disappeared entirely, although there was still evidence of moisture to be heard by the stethoscope over the right middle lobe. By the end of 72 hours however this had also disappeared. The boy gained 11 pounds in the following 2 weeks and has remained well ever since.

The blood was negative. The temperature was never above 100°F. during his stay in the hospital.

The mother of this boy was in the hospital at the same time. She had taken sick at the same time and in the same way.

The presence of diphtheria bacilli in the lungs is not rare after death in cases of recent or present diphtheria. Reye[1] for instance, found it present in 68 per cent. of such cases. Pearce[2] found it 10 times in 94 cases. Schmidt[3] reports 2 cases in which diphtheria bacilli persisted in the sputum one for 1 month and one for 10 years.

So far as I have been able to discover however no other case is reported of a definite lobar inflammation apparently due to the diphtheria bacillus alone and cured completely in 3 days by antitoxin after persisting for $3\frac{1}{2}$ months.

We have not encountered the condition again, although at times, we have repeatedly examined the sputum of series of cases for diphtheria bacilli.

AVIRULENT COCCUS INFECTIONS

The second condition I wish to refer to especially is a type of lobar pneumonia beginning as what the patient describes as a cold settling on the lungs with fever and malaise for 2 or 3 days. After this the patient usually returns to normal life, but persists in coughing and expectorating, sometimes quite a fair quantity 15 to 20 cc. of yellow sputum in 24 hours.

A number of such cases are finally sent to the hospital for tuberculosis.

We have seen thirteen this year. The following is a typical history.

M.S. Age 26—social worker in New York. Always well till October, 1914, then a cold settled on her lungs. After a few days in bed with fever at the onset she returned to work as usual. The cough and sputum continued, otherwise she was perfectly well. The case was diagnosed tuberculosis and she was ordered to a sanatorium. Instead she started for California and stopped in Pittsburgh to see a sister.

Three months after the onset, physical examination revealed a very well woman except for dullness, increased breath sounds and moist rales on cough and deep breath over the whole lower left lobe of the lungs.

Thyroid increased in size, fine tremor of fingers.

Sputum examination, streptococci, staphylococci, pneuumococci all abundant: 15 c.c. daily. Smear and antiformin frequently and guinea pig innoculation negative for tubercle bacilli. Blood R.B.C. 4,648,000, W.B.C. 7000. Diff. count normal. Blood culture negative. Temperature maximum 99.5, gain in weight 6 pounds in 3 weeks under rest. Negative reaction to tuberculin. Left for California to live with her parents.

The history of the malady is similar in all cases.

Riesman,[4] has called attention to the condition which he describes as a "confluent lobular pneumonia of lobar distribution, long duration, low fever, impairment of resonance, broncho vesicular breathing, showers of crackling rôles. Sputum and cough. They heal without residue."

I prefer to think of them as avirulent pneumococcus lobar pneumonias. None of our cases have come to autopsy, so that clinical study is our only basis for differentiation. Beyond the clinical description given above the pneumococcus group of organisms is the most abundant in the sputum. It is quite avirulent for though we have not tried it on mice it produces no illness in guinea pigs. The lesion is confined to one lobe. It differs from ordinary pneumonia in its long persistence (3 to 5 months) without clearing up, but resembles pneumococcus infections in finally completely clearing up.

It seems similar to the description of "Insufflation of non virulent pneumococcus" by Wollstein and Meltzer.[5]

"Intra bronchial insufflation of non virulent pneumococcus produces an exudate in the lungs but leaves the framework unaffected. It has the gross appearance of lobar pneumonia. The consolidation tends to more rapid resolution, is non fatal, the blood is not invaded, the exudate is poor in fibrin and the progress is slower."

I am impressed in my own cases and in those of Riesman with the superficiality of the study of the past cases which becomes evident when we attempt

to reproduce them from the records. I would like to put in a plea for more thorough study of cases in our tuberculosis hospitals. Our eyes are so keenly fixed upon the tuberculosis that our diagnosis resolves itself into positive or negative for this disease without further interest if the result be negative. The persistence with which some men insist on forcing negative cases into the tuberculous group, if turned in the direction of answering the question what is it if it is not tuberculosis? would put us further on our journey of differential diagnosis.

During the coming winter season we hope to be able to study these cases in the light of the newer pneumococcus studies of Neufield, and Cole and his associates. In many blood cultures we have never had a positive culture in this type of case, so that isolation of the organism must be made from the washed sputum.

BRONCHIECTASIS

A great deal is to be learned I feel from the bronchiectasis cases, but we are not ready to report at this time. I mention them only to urge study of them. No cases are more distressing or more poorly understood. I think these cases will surely reward the student by revealing some specific causal agent when the search is successful. Today, however, they find no resting place, their foul smelling frequent sputum excludes them from most institutions and there is no help to offer them.

ABSCESS OF LUNG

Abscess of the lung I mention only to urge the need for development of lung surgery in this country. A number of men have been temporarily interested in it but have not persisted in its study. There is no greater room for display of originality in overcoming difficulties than in a surgical procedure to return to health these distressing cases which we all meet.

In conclusion I apologize for the incompleteness of this report which we will dissociate and enlarge later. I point out however the opportunities for chest hospitals to do excellent work in the study of differential diagnosis. Occasionally a brilliant cure like that in our diphtheria case will be the reward, and a lot of mental suffering will be saved by eliminating tuberculosis as the malady in other cases.

BIBLIOGRAPHY

[1] Munch. Med. Woch., October 29, 1912, p. 2383.
[2] Cent. fur Bact. Ref., xxiv, 1899.
[3] Munch. Med. Woch., January 7, lx, No. 1.
[4] Am. J. M. Sc., September, 1913.
[5] Jour. Exp. Med., Vol, 17, No. 3, p. 361, March 1, 1913.

DISCUSSION ON PAPER BY DR. WHITE

Dr. George Mannheimer, New York: This discussion is really on differential diagnosis. The cases of diphtheria of the lung are new to me. We are all familiar with the broncho pneumonias in the course of diphtheria, with diphtheria carriers, and with the diphtheritic inflammation of the fauces, larynx, trachea and bronchi. It is remarkable to have a consolidation of the lung disappear in 24 hours under diphtheria antitoxin. Aside from neoplasms, Hodgkin's disease, actinomycosis infection with streptothrix and blastomyces coccidioides, we have the cases of lung abscess, gangrene, bronchiectasis, perforating empyema and the pneumokonioses which have so much in common with tuberculosis that they are often admitted into tuberculosis institutions. From a differential diagnostic point these cases are characterized by the comparatively good state of health, the appearance of the sputum, the predilection for the lower lobes and the influence of posture on drainage. It is no wonder that we make diagnostic mistakes from the sputum when we collect it in tin or pasteboard cups. If we have a doubtful case we should let him use a glass cup. The sputum is usually diffuse in quantity and has a bad odor. We should examine the sputum as thoroughly as we do urine, feces, gastric content, etc. We might then ascertain the 24-hour quantity, the layering, the odor and the characteristic morphological elements. If elastic fibers appear and no tubercle bacilli, we are not dealing with tuberculosis. If a coal miner leaves his occupation and the coal-laden district but continues to expectorate black sputum, we may infer that the pigment comes no longer from the surface of the lining membrane, but from the parenchyma of the lung, in other words that lung tissue is breaking down. The absence of tubercle bacilli in such a case also speaks against tuberculosis. Negative findings must not be altogether neglected. I know of a case in which 138 sputum examinations over a number of years gave a negative, but the 139th time a positive result for tuberculosis bacilli. The patient was for some time in a sanatorium and might have been infected there. The physician who found bacilli at last will not admit the likelihood of a superimposed tuberculous infection and cannot be argued with. We must endeavor to recognize these cases of chronic lung suppuration and to keep them out of tuberculosis institutions or send them out, if we find them there.

Dr. J. S. Cipes, Albuquerque, N.M.: I would like to ask Dr. White whether his patients had suffered from diphtheria or had been subjected to the diphtheritic bacilli within 2 years previous to the development of the diphtheria of the lungs.

Dr. Edward O. Otis, Boston: I would add 2 cases to Dr. White's list. Actinomycosis, which is sometimes mistaken for tuberculosis, and also syphilis of the lung. If the Wassermann reaction were oftener tried in tuberculosis, we might find that we were dealing with cases of syphilis either with or without complications of tuberculosis.

Dr. Ethan A. Gray, Chicago: There is one point in the matter of negative findings and that is staining. The tubercle bacillus is found sometimes in

an attenuated form, staining poorly with carbol fuchsin. If Much's stain is used instead it may be detected. In the case which gave a positive result at the 139th examination, the bacilli may have recovered their acid fat and thus have resumed their tinctorial quality.

Dr. Joseph F. Griggs, Tacoma, Wash.: There is one disease which appears particularly on the Pacific Coast where so many Chinese and Japanese are living, which has not been mentioned, that is lung fluke.

Dr. Lydia M. DeWitt, Chicago: I was very much interested in the plea for more careful examination of the sputum. It is unfortunate that the practicing physician, in sending in the samples of sputum for examination by the City Laboratory can usually expect only a return of "positive" or "negative." So many times this return, especially after a single examination, means nothing and gives the physician very little information regarding the character of the sputum. It may be difficult but it is possible in the laboratory to correct this fault. The irregular time of sending in the sputum, the condition in which it is sent, and the lack of clinical data often make the examination of little value. More cordial coöperation between the practitioner and the laboratory men will correct many of these faults. My work at present is in experimental tuberculosis and in this also a source of error is the careless autopsy. Cases are wrongly diagnosed and it is only by careful bacteriologic and microscopic examination that we can make a correct differential diagnosis.

Dr. Alfred Meyer, New York: I would add another point to the discussion. I should like to see some work repeated that we have been doing in New York, that is of sputum examination by the concentrated salt solution method, rather than by the Uhlenluth method with antiformin. The *Medical Record*, New York, a year and a half or two ago published favorable results of examination by this method. Dr. Mannheimer remarked on the late appearance of the bacillus. I don't think that necessarily means infection subsequent to admission to the institution. I knew a patient who was sent away for one year and came back with a gain of 30 pounds in weight. Then for the first time tubercle bacilli were found, confirming a diagnosis made of tuberculous pneumonia. A bacterial endocarditis is sometimes mistaken for tuberculosis. Then we have the leukaemias, and parasitic diseases such as bothriocephalus latus, which may give rise to similar symptoms. In these cases eosinophilia may be a guide. In the *Berl. klin. Wochenchrift* some years ago there was an account of infection of the lung by smegma bacillus. The elder Janeway wrote of febrile syphilis and mentions that it is mistaken for tuberculosis. Here, *x*-rays of the lung and the Wassermann reaction will help in diagnosis.

Dr. Christen Quevli, Tacoma, Wash.: In the last 3 years 2 cases have come to my notice which on account of rapid pulse, loss of weight and weakness were diagnosed as tuberculous. They turned out to be early stages of exophthalmic goiter. The exopthalmus and goiter were hardly noticeable.

Dr. George Mannheimer, New York: The case I spoke of was a young man who developed bronchiectasis after pneumonia in eighth year. He

lived on the lower East Side of New York and had the classical symptoms of bronchiectasis with remissions and exacerbations. In his twenty-fourth year the first tubercle bacilli were found.

Dr. White: There are two sources of tubercle bacilli in the sputum. They may come from outside the body but so seldom as to be a negligible factor ruled out by repeated examination. Otherwise they come from inside the body. In order to do this tubercles must break down and discharge into the bronchial tree. Such a thing may happen at any moment, before or after admission of the patient to a sanatorium. It seems unjust therefore to me to suggest that the appearance of tubercle bacilli in the sputum after entrance to a sanatorium is proof that the tuberculosis was contracted there.

I am strongly of the belief that not only should tuberculosis be treated in the general hospital, but that as long as we have chronic lung diseases requiring the same care as the tuberculous the sanatoria should be open to them. There is no place else for them to go, and I think the sooner we change the name of the sanatoria to chest hospitals and accept openly our whole duty the better it will be not only for the consumptive but for all lung cases, requiring diagnosis and care.

We have reached a point where pulmonary tuberculosis is considered a separate disease not allied to the subject of tuberculosis as a whole. We are again in a pre-Kochian period of segregation with sad results to the general problem.

I am in accord with Dr. Mannheimer's suggestion as to more thorough gross examination of the sputum. For the past year we have been using glass cups so that the amount and character of the sputum can be charted. I think we can in this way furnish a means of rough measure of the extent of lung lesion, to the visiting nurse. Not all cases can be seen by the physician. The visiting nurse, however, can bring back information to the doctor in the dispensary. I think there can be a definite relation determined between the amount of sputum and the extent of the lesion in the lung, which will serve to indicate the character of the case.

THE TREATMENT OF PULMONARY HEMORRHAGE BY VENESECTION

By A. G. Shortle, M.D.
Alberquerque, N. M.

"In adverting to authorities in favor of the practice of blood letting in the treatment of hemoptysis it would be mere trifling to introduce the names of those who have recommended it. I might as well at once refer to almost all the practical writings which compose our libraries."

It is perhaps unnecessary to explain that the foregoing was written almost a hundred years ago, in 1822 to be exact, and was in defense of a practice that was already falling into disfavor, a disfavor which has practically resulted in abandoning venesection as a therapeutic measure in pulmonary hemorrhage for three-quarters of a century.

There can, of course, be no defense for the indiscriminate blood letting of a century ago as practiced for any and all ills, but it is the belief of the writer that just as we have found venesection of value in certain selected cases of pneumonia, a few heart conditions, apoplexy, and a number of other conditions, so in properly selected cases of hemoptysis will this procedure prove beneficial.

In looking up the literature of the subject I found much that was quaint and interesting in the writings of a hundred years ago but the authors appeared to have no theoretical basis for the use of the procedure that would pass muster in the light of modern knowledge. The writings of the last twenty years practically fail to mention venesection as a therapeutic measure in hemoptysis except to condemn it. In a search through the books at my command I found that Dr. George Andrew Pierce, writing in the *Medical Record* in 1903, tells of treating a case of pulmonary hemorrhage in this way with good results.

Lawrason Brown in the *American Journal of Medical Science* in 1906 mentions venesection as a possible measure for reducing the arterial tension in hemoptysis.

Heisler and Turner in 1910 in discussing the control of hemoptysis by pneumothorax add that "in hopeless cases free blood letting may be employed as a last resort and may give good results."

In none of the above, however, was there any attempt to classify the types of cases in which it might prove of value.

Absolutely the only attempt to describe symptoms or conditions that might make venesection a procedure of therapeutic value in hemoptysis, that I have been able to find in books old or new, is in Bonney's excellent work on tuberculosis. That experienced clinician points out several conditions that should be considered indications for its use but dismisses the subject with a few words. To quote: "Occasionally good results may be obtained by moderate

venesection, especially when the initial loss of blood is slight, small hemorrhages frequent, and blood pressure abnormally high."

He also states that if the dreaded sequel to pulmonary hemorrhage, broncho-pneumonia, occurs "venesection is permissible in the presence of a laboring or dilated right heart, highly elevated blood pressure, pulmonary edema, cyanosis, and coma. The degree of temporary improvement is often astonishing and quite beyond the imagination of those unfamiliar with the effects of this procedure in such desperate conditions."

Dr. James Talley in Musser and Kelly's *Internal Medicine* quotes from Bonney the indications given above and adds that in nephritis complicating tuberculosis of the lungs and a high blood pressure appeared to prolong the bleeding, venesection should prove of value.

The one symptom, however, which above all others, to my mind, demands venesection in hemoptysis has never been mentioned as an indication as far as I can find. I refer to the case, not so infrequently seen, where the pulmonary bleeding is seriously interfering with the lungs function of respiration. I can best illustrate this by briefly citing two cases where I found the proceeding beneficial.

Case I.—A third stage of chronic tuberculosis with extensive involvement of the left lung and moderate involvement of the right lung. The left lung had been collapsed some six months previously and the patient was doing well when a break in a vessel at the base of the right lung occurred. The flow of blood was not great but as it welled up from the bottom of the lung the patient's coughing caused the inspiring of the blood through practically the whole of the working lung and when I arrived it appeared that the patient would drown in his own blood if not relieved. I felt that bleeding would only stop when there was sufficient loss of blood to lower the blood pressure to a point where a clot would form, so why would it not be better to have him bleed through the arm instead of through the lung. Prompt venesection resulted in a quick cessation of the hemoptysis.

Case 2.—Differed from the foregoing only in so much as instead of a collapsed lung there was an extensively involved right lung with extensive cavitation. Bleeding occurred in the lower lobe of the left lung causing great embarrassment to the respiration. Venesection acted promptly in this case also.

I feel that the quick relief to the impaired respiration is not the only benefit rendered in such cases. The prompt relief of the coughing and struggling for breath with the coincident inspiring of blood and sputum into the air cells is also stopped and the likelihood of that most dangerous of the sequelae of pulmonary hemorrhage, broncho-pneumonia, is much less likely to occur.

This procedure is also justified by what we know of the compensating mechanism of the vascular system. In slow bleeding the blood-pressure is little influenced until an enormous amount of blood is lost, since the heart beats faster, the peripheral vessels are constricted, there is an increased flow of lymph, and the surrounding tissues give up part of their fluids (2.3), but if a pint or more of blood is taken quickly the pressure falls, the respiration becomes slower, the heart action slackens (4.5) and a blood clot can form before

compensation can take place. It appears that bleeding also increases the coagubility of the blood (6).

In conclusion: It is the opinion of the writer that while in the vast majority of pulmonary hemorrhages venesection would be unwarranted, in the occasional case where the bleeding is seriously impairing the respiration the procedure is most valuable.

It is also to be considered in a slow persistent bleeding, the more so if accompanied by constant cough with consequent inspiration of blood clots. It is all the more justified since without disparaging the efficacy of our medical treatment it can be said that the usual cure of hemoptysis is the loss of a few ounces of blood and in many ways it is safer to come from the arm than form the lung.

LITERATURE

1. Hazeltine, Richard: "Observations on the efficiency of blood letting in hemotysis," New Eng. Jour. of Med. and Surg., 1822, x, 337.
2. Starling, Earnest H.: Princ. of Human Physiology, 1912.
3. Wiggers, Carl J,: Arch. Int. Med., 1910, v, 348.
4. Faught, F. A.: Blood pressure from the clinical standpoint, 1913.
5. Janeway, Theodore C.: The clinical study of blood pressure, 1904.
6. Cummins, R. S.: Treatment of pulmonary hemorrhage, Cal. State Med. Journal, 1914, xii, 322.

Those interested in the views held a few generations ago on this subject will find much that is quaint and interesting in the following:

a. Sydenham, Thomas: Works, vol. ii, p. 280. On vomiting and spitting of blood.
b. Rushes defense of blood letting, vol. iv, ed. 3, p. 368.
c. Letter of Dr. Samuel S. Smith, president of the College of New Jersey to Dr. Benj. Rish, Phil. Med. Museum, 1805–6, ii, l.
d. Cheyene, J.: Dublin Hospital Reports, 1830, v, 351.
e. Aran, F. A.: Bull de therapeutique, 1855, xiix, 193.
f. Markham, W. O.: The uses of blood letting in disease. British Med. Jour., 1864, 363.
g. Tweedie, Alexander: System of Prac. of Med., 1840, vol. v, 32.
h. Bowman, James: Edinburgh Med. and Surg. Jour., 1824, xxii, 41.
i. Clutterbuck, Henry: Lectures on blood letting. London, Med. Gaz., 1838, xii.
j. Cullen, Wm.: First lines on the practice of physic, 1788, vol. 2, p. 351–252.
k. Fercog, G. A.: Is blood letting the only remedy for hemoptysis, Strasburg, 1805.
l. Gillard: L. Gaz. Med. de Par., 1854, 3, s, ix, 35.

ARTIFICIAL PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS

RESULTS OBTAINED BY TWENTY-FOUR AMERICAN OBSERVERS

By Theodore B. Sachs, MD.

Chicago

The American experience with artificial pneumothorax treatment of pulmonary tuberculosis dates from 1898, when Dr. John B. Murphy of Chicago described the new method and reported five cases in his oration on "Surgery of the Lung" before the 49th Annual Meeting of the American Medical Association in Denver, in 1898.

Previous to that, unknown to Dr. Murphy, Dr. Carlo Forlanini of Pavia, Italy, suggested the method in 1882, followed this by years of experimental work and reported his first case of cure of an advanced unilateral case in 1895. During the last twenty years, Forlanini applied the method in a large number of cases.

The popularization of the method followed the publication, beginning in 1906, of an immense amount of experimental and clinical work by L. Brauer, of Marburg, and his associates, L. Spengler and others. The introduction, in 1907, by C. Saugman of Christiania, of the water manometer, for determination of the pleural space, rendered the method safer and greatly stimulated its rapid adoption in Europe, United States, and other countries.

Following Dr. Murphy's brilliant exposition of the subject in 1898, his associate, Dr. A. F. Lemke, continued the work under his direction, reporting, in 1899, 53 cases.

In studying these cases, we find that 2 were apparently in the first stage, 25 (or 47 per cent.) in the second and 26 (or 49 per cent.) in the third. In 43 cases (or 81 per cent.) the involvement was apparently unilateral; in 10 cases (or 19 per cent. of the total)—bilateral. Presence of cavities is indicated only in 4 cases; fertile cases—22 or 41.5 per cent.; hemorrhage—4 cases. From 1 to 5 injections were given in 51 cases; a larger number in one case. Amount of nitrogen gas used was from 100 to 125 cubic inches, in one-third of the injections; from 110 to 148 cubic inches, in one-half of the number. Shortest interval between injections was 16 days; in 37 per cent.—3 to 4 weeks and in another 37 per cent.—4 to 5 weeks. No manometer was in use at that time. The immediate results of treatment are given in 50 cases, after a period of observation from 4 to 6 months. Ten patients were sent west. Pleural effusion occurred in 3 cases; gas embolism with permanent hemiplegia —in one case and spontaneous pneumothorax with death—in another.

Translating carefully the results given by Dr. Lemke in 50 cases, into terms in use at present by The National Association for the Study and Prevention of Tuberculosis, we get the following figures:

	Per cent.		
Quiescent	4 cases or 7.5	*Unimproved or worse*	8 cases
Improved	26 cases or 49	*Deaths*	2 cases
Sent to other climates			10 cases

The untimely death of Dr. Lemke prevented the continuance of his work and publication of the subsequent results.

Following the introduction of the method by Dr. Murphy and his associate, the use of nitrogen gas compression was tried by several men in this country, notably at the Loomis Sanatorium, Liberty, New York, and other places. Various considerations, particularly the complications occurring in the course of treatment, led to the discontinuance of the work for a number of years.

Since the publication of Dr. Brauer's work, the method was reintroduced in this country in 1910, among the pioneers being Robinson Floyd and Balboni of Boston, Hamman and Sloan of Baltimore, Mary Lapham of North Carolina, and others. The method has grown in favor, particularly in the last 3 years, this paper presenting an analysis of the results of work, in this period of time, by 24 American observers. The results reported by them furnish a sufficient basis for the estimate of the efficacy of the method.

In many of the papers, studied by the author, certain data are missing and there is a variation in nomenclature, this rendering absolute exactitude of comparison impossible and necessitating conservative personal interpretation. A careful effort was made by the author, by thorough study of reports of individual cases to bring uniformity, in the designation of the results of treatment, in accordance with the scheme used by the National Association.

The work analyzed in this paper represents the collective experience of a large number of hospitals and sanatorium men all over the country, who during the last several years have given considerable study to the subject.

CLASS OF CASES TREATED

Of 1145 cases reported, the stage of disease is given in 1028. Of this number 912 or 88.7 per cent., were in the far advanced stage, 109 or 10.6 per cent. —moderately advanced, 7 or 0.7 per cent. incipient; 5 were cases of bronchiectasis, 5 pulmonary abscess, 1 tumor.

As shown in Table I, the side involved is designated in 897 cases out of 1145 or 77 per cent. of the total; bilateral involvement was present in 691 cases or 77 per cent.; unilateral—206 cases or 23 per cent. Presence or absence of cavities is given in 606 cases or 53 per cent. of the total. Of the 606 cases, cavities were present in 378 or 62 per cent. The presence of tuberculous complications is given in 489 cases or 43 per cent. of the total. Number of tuberculous complications—112 or in 23 per cent. of the 489 cases in which complications were recorded. Of the 112 complications, 69 involved the larynx, 23 the bowels and 15 were either empyemas or pleural effusions.

It is apparent from the large proportion of far advanced cases (88.7 per cent.) (with bilateral involvement present in 77 per cent., cavities in 62 per cent., and serious tuberculous complications in 23 per cent.), that artificial pneumothorax is being tried at present in this country chiefly in very advanced cases unimprovable under ordinary sanatorium regime. This must be taken into consideration in judging the "immediate" and "subsequent" results obtained in 1145 cases analyzed in this paper.

The degree of compression obtained in individual cases, as judged by physical signs and subsidence of constitutional disturbance (in some by *x*-ray plate and fluoroscope), is given in 757 cases or 66 per cent. of the total number reported. Of this number, satisfactory compression was obtained in 390 or 51.5 per cent.; partial—in 205 or 27 per cent.; failure—in 162 or 21.5 per cent.

IMMEDIATE RESULTS OBTAINED IN 1145 CASES REPORTED BY AMERICAN OBSERVERS

The results of treatment, as given in 1108 cases (out of 1145), can be designated as follows:

As in over 90 per cent. of these cases the result was recorded, either still in the course of treatment or a few months after its discontinuance, and only in 10 per cent.—a few months to 3 years after discontinuance, the results should be designated as "immediate."

The method was unproductive of *any* beneficial effect in almost one-half of the cases (failures, unimprovements and deaths amounting to 49.1 per cent.). 29.2 per cent. were "improved" the improvement being, probably, of limited duration in the majority of these cases; 21.7 per cent. is the total of the "quiescent," "arrested," and "cured" cases.

Thus the *immediate* beneficial result of artificial pneumothorax treatment of these 1108 cases was mostly palliative in 29.2 per cent. and *apparently* durable in 21.7 per cent.

Comparing the results obtained by the American observers with the results recorded in 224 cases by Brauer, Spengler and Zink, after a period of observation extending from 6 months to 5 years, we find the following:

The total percentage of failures, unimprovements, and deaths in the American cases was 49.1, as compared with 42.9 in the cases reported by Brauer, Spengler, and Zink. It is apparent, that with the class of cases selected at present for artificial pneumothorax, the method is either inapplicable or is unproductive of *any* beneficial effect in almost one-half of the cases.

Most of the "improvements" (American 29.2 per cent.; Brauer, Spengler and Zink, 31.2 per cent) can be classed under the head of "palliative effect."

The group of "quiescent" cases (American 10.8 per cent.; Brauer, Spengler and Zink, 9.8 per cent.) includes, in all probability, a proportion of "durable results," a term that can be unequivocally applied only to almost all the "arrested" or "cured" cases (American 10.9 per cent.; Brauer, Spengler and Zink, 16.1 per cent.)

TABLE II.—SUMMARY OF RESULTS OF TREATMENT IN 1108 CASES REPORTED BY 24 AMERICAN OBSERVERS

	No.	*Per cent.*			*No.*	*Per cent.*	
Failure	162	14.6	49.1	Improved	323	29.2	21.7
(Failure 152, very small amounts 10)				Quiescent	119	10.8	
Unimproved	203	18.3		App. arrested (or arrested)	105	9.5	
Dead	130	16.2		Cured	16	1.4	
				Total	1,108	100.0	

Working—69 or 6.5 per cent.

TABLE III.—COMPARISON OF RESULTS OBTAINED BY AMERICAN AND SOME EUROPEAN OBSERVERS

	24 American Observers		*Zink (observed 6 mos. to 2 years)*		*Brauer and Spengler (6 mos. to 5 years)*	*Total*	*Per cent.*	
No. of cases	1,108		110	+	114 =	224		
	Per cent.							
Failure	14.6	49.1	29		26	55	24.6	42.9
Unimproved	18.3		16		6	22	9.8	
(+ discontinued early)			("worse") (number dead?)					
Dead	16.2				19	19	8.5	
Improved	29.2		34		36	70	31.2	25.9
Quiescent	10.8	21.7	22			22	9.8	
			("working")					
Arrest or Cure	10.9		9 (cured or working)		27	36	16.1	
	100.0						100.0	

TABLE IV.—SUBSEQUENT COURSE OF CASES OBSERVED FROM ½ TO 7 YEARS

	No. Cases	*Failure*	*Unimproved*	*Dead*	*Improved*	*Quiescent*	*Arrest or cure*
Balboni (a few mos. to 3½ years)	70	10	14	18	16	6	6
		60 per cent				17.1 per cent	
Brauer and Spengler (½ to 5 years)	114	26	6	19	36		27
		44.7				23.7	
Saugman (½ to 7 years)	200				5		15
Total	384				Average	14 per cent.	

TABLE V.—SUBSEQUENT COURSE OF "REËXPANSION" CASES

(Observed from 3 months to 7 years)

	Total No. Cases	*Reëxpansion*	*Treatment suspended*	*Present condition of reëxpansion cases*			
				Active	*Improved*	*Quiescent*	*Arrest Cure*
Balboni	70	17	8 mos. to 3½ years	3	3	5	6
Saugman	200	30	½ to 7 years		5		15
Lapham	67	14	a few mos. to 4 years			14 ("excellent condition")	
Shortle	110	15	a few mos. to 2½ years			15 ("working")	
	447	76			55 or 12.3 per cent. of the total		

THE SUBSEQUENT COURSE OF ARTIFICIAL CASES

The efficacy of artificial pneumothorax treatment can be judged only by the subsequent course, through a long period of years, of a large number of cases. In studying the American literature and some of the European, I was unable to gather any voluminous data bearing upon this important question. Some figures of interest are given in Tables IV and V.

It may be a conservative estimate to say that, with the present technique and the class of cases treated, the percentage of durable results ("arrests" or "cures") is about 12 per cent., while in double this number (29.2 per cent. of 1108 cases analyzed in this paper) a palliative effect is produced, which is of variable duration. The sum total is a distinct increase of the chances of the advanced case which does not respond to the usual methods of treatment.

SELECTION OF CASES FOR ARTIFICIAL PNEUMOTHORAX

Various problems enter into consideration in the selection of cases for artificial pneumothorax.

1. In less than one-third of far advanced cases (29.2 per cent. of improvements" in the 1108 cases reported by American observers) the effect is chiefly palliative, slightly or markedly, lasting a variable period of time.

In the same class of cases, only slightly more than one-half of the immediate "apparently" durable results (21.7 per cent. of quiescent, arrested or cured cases out of a total of 1108 analyzed in this paper) stand the test of time as shown by the smaller percentage of 12.3 in cases under observation from a few months to seven years after "reexpansion" (Table V).

2. A free pleural space is essential in the attainment of "satisfactory compression" (effective pneumothorax). In far advanced cases, similar to 1108 cases analyzed in this paper, the pleural space is, usually, completely obliterated in about 20 per cent. and partially in more than 30 per cent.

A comparison of 66 "partial compression" cases, with 153 cases in which satisfactory compression was obtained (out of the American series—Table I) gives, in the "immediate" results, 18.2 per cent. of quiescent and arrested cases for the "partial compression" group, 47 per cent. of same results in cases with satisfactory compression.

3. The condition of the opposite lung is of vast importance in the attainment of durable results. Comparing the "immediate" results of artificial pneumothorax treatment in 91 unilateral cases and 162 bilateral, out of the series of cases by American observers, we find that the percentage of unimprovements and deaths in unilateral cases was 12, in bilateral cases—43; the percentage of quiescent and arrested cases—50.5 in unilateral and 24.7 in bilateral.

4. Failure of progressive cases of pulmonary tuberculosis, to respond to sanatorium methods of treatment (absolute rest, open air, etc.), after a sufficient period of trial, should be the basis, regardless of stage, for consideration of lung compression. Numerous factors will determine the decision, such as rapid extension of the process, marked constitutional disturbance, rapid im-

pairment of the general condition, etc. The preliminary observation of the cases should be thorough, by the use of all the clinical and laboratory methods and with the aid of *x*-ray examinations.

It is the gradually formulating consensus of opinion among the majority of observers that the best results can be obtained before the occurrence of extensive adhesions, marked involvement of the opposite lung and the irrepairable deterioration of the general resistance.

DANGERS AND COMPLICATIONS INCIDENT TO THE PRODUCTION OF ARTIFICIAL PNEUMOTHORAX

With the gradual perfection of technique and a more careful selection of cases, accidents occurring in the course of pneumothorax treatment are gradually diminishing in number. Nitrogen gas should never be permitted to enter, until the manometer establishes the connection with free pleural space, by sustained negative pressure and free oscillations. Asepsis is another important factor. Local anaesthesia of the entire needle track is insisted upon by many observers for the prevention of pleural shock. Excessive pressure within the pleural cavity should always be avoided. Even positive pressure is not entirely necessary for the production of effective compression. An important exception should be made in cases of severe hemorrhage, in which bleeding persists until a marked positive pressure is established. The method should never be employed in the presence of severe cardiac complications.

Saugman reports 14 serious mishaps and 1 death in a series of 98 cases and 2000 punctures, in his early experience, in the period from 1906 to 1910. From 1910 to 1912, he had 2 mishaps and 1 death, in 63 cases and 1200 punctures. Since 1912, with more careful technique, he reports no mishaps, in 49 cases and 2000 punctures.

This has chiefly reference to pleural shock and air embolism.

Pleural effusion, the most frequent complication, in the course of artificial pneumothorax, is variously ascribed to infection, to progressive irritability of pleura caused by trauma, to slowing of lymphatic circulation in the compressed lung, to breaking of tubercle through pleural surface, etc. The frequency of its occurrence, in the experience of some observers is dependent on the extent of the process and duration of treatment. Strict asepsis and careful technique may be a considerable factor in its prevention. At present, its incidence is estimated from 30 to 50 per cent.

Of 748 cases, reported by 15 American observers, who recorded in their reports the frequency of this complication, pleural effusion occurred in 113 or 14.4 per cent. of the total number of cases. The small percentage may be due to the inclusion of a large number of cases reported in the early period of treatment and omission of small effusions the presence of which can be ascertained only by frequent physical and *x*-ray examinations.

There is considerable difference of opinion as to the effect of effusion on the further progress of a case treated by gas compression. While improvement does occur in a certain percentage of cases, occurrence of effusion is regarded by most experienced observers as a complication affecting the future outlook

of a case. This is borne out by the frequent occurrence of adhesions preventing future compression and frequent extension of the process in the opposite lung. We are in need of more comprehensive data on this subject.

Gas embolism is a rare incident in pneumothorax therapy. Its onset is sudden. The manifestations vary from temporary unconsciousness, convulsions, temporary hemiplegia, and gradual recovery, or fatal termination in a few hours or two or three days, to the gravest form, in which a severe coma without any preliminaries results in almost instant death.

The air or gas may come through the needle, from the lung (cavity) or pleural space. The pulmonary veins, because of the negative pressure in these vessels, present the most favorable condition for the entrance of gas. The incident is more frequent where pleural adhesions are penetrated by the needle, the gas being introduced through one of the veins into the circulation (Brauer). Fatal termination results from the final lodgment of air or gas in the coronary arteries or vessels of the brain (Saugman). According to Wolff-Eisner thrombi are responsible for some of the incidents described under the head of air or gas embolism.

It is the consensus of opinion that this grave incident is almost impossible with intelligent interpretation of manometer findings (sustained negative pressure and wide oscillations).

According to Matson "this accident should belong to the first historic period of pneumothorax therapy."

In Saugman's experience one death occurred between the year 1906 and 1910 (with 98 patients and 2000 punctures); between 1910 and 1912—one death (63 patients, 1200 punctures); between 1912 and 1914, with more careful technique (49 patients, 2000 punctures)—no mishaps.

Reports of this rare but grave incident are scattered over the European literature (Brauer, 4 cases, Saugman, 2, Zink, 1, etc.) Forlanini encountered the accident four times in 10,000 operations (2 fatal).

Of 1058 cases treated by 22 American authors, 3 incidents of gas embolism occurred in a group of 191 cases reported by 3 authors while 867 cases, treated by 19 authors, were free from the incident. The latter group includes 74 cases treated by the author (700 injections).

The incidents described, in the American and European literature, under the name of *pleural shock* (pleural reflex or eclampsia) vary from slight manifestations of faintness to disturbances of various degrees of the circulatory, respiratory and nervous motor and sensory systems. With few exceptions, the manifestations, as given, are mild, of passing nature and with no after effects. A few fatal terminations were recorded by European observers.

The present tendency (particularly Brauer) is to ascribe many of the grave manifestations included under "pleural reflex or shock" to "gas embolism."

The mechanism of production of pleural reflex is given by Russell (see Fishberg) as follows: "afferent impulses conveyed to medulla along vagus, whose terminal fibers rendered unduly sensitive by compression, or inflammation are irritated by the needle." Death is generally ascribed to spasm of cerebral or cardiac vessels.

Anaesthesia of the needle track (novocain ½ to 1 per cent., adrenalin 1 to

10,000) through the skin, the underlying tissues and pleura, is urged by most observers as a preventive of this complication and yet, the incident was absent in groups of cases treated without any anaesthesia (E. A. Gray, 145 cases, 1200 injections; the author, 74 cases, 700 injections, and others).

Saugman reports one case of pleural shock in 104 cases (paralysis of heart; death); Forlanini, 12 occurrences in 134 patients, 10,000 injections.

Of the 1058 cases in the American literature, analyzed in this paper, pleural shock occurred 26 times or in 2.5 per cent. of cases. No fatalities.

Of the 1122 cases reported by 24 American observers in the last 2 years or more, the incidence of various complications, occurring in the course of treatment, was as follows:

Pleural effusion	113
Extension of process in opposite lung	58
Bleeding other lung	7
Pleural shock	26
Gas embolism	3
Spontaneous pneumothorax	10
Bilateral pneumothorax	2
Pyopneumothorax	13
Cardiac dilatation and heart failure	4
Torsion of heart and blood vessels	1
	237 or

21 per cent. of the total number of cases.

CONCLUSION

Experience with artificial pneumothorax in the treatment of pulmonary tuberculosis is gradually modifying the sphere of its application. The trend is toward its use, regardless of stage, in all progressive cases (particularly with unilateral involvement) which fail, after sufficient trial, to respond to strict sanatorium regime.

Complications incident to the employment of this method, the great importance of continuous strict observation and thorough clinical, laboratory and *x*-ray study of each individual case, the rest periods essential after each reinflation, the inability of outlining in advance the time of reinflations, in short, the close dependence of each successive step in pneumothorax therapy upon the varying condition of the patient, all these factors call, in majority of cases, in the interest of safety and best results, for hospital or sanatorium supervision, at least for a few months, of each individual case, in which the method is being applied. Close attention to every important detail of technique, as well as strict asepsis, are also less of a problem, under such conditions, this regardless of the excellent results obtained by some observers, in dispensary and office practice.

The present tendency, grown out of experience, is toward greater conservatism in the selection of cases, a selection based on thorough preliminary study and full consideration of the possible effect of compression in the individual case. Conservatism needs to characterize each successive step, in the gradual attainment and subsequent maintenance of a satisfactory compression, with avoidance of too frequent reinflations and excessive intrapleural pressure.

This attitude is very important, with a method the application of which cannot be subject to rule but is dependent on the condition of each individual case.

Through improvement of various details of technique and greater conservatism of action, pneumothorax therapy is gradually finding its defined place in the treatment of cases of pulmonary tuberculosis which do not yield to other methods.

BIBLIOGRAPHY

Adelung, von E.: Journal American Medical Association, June 20, 1914.
Balboni, G. M.: Boston Medical and Surgical Journal, November 5 and December 24, 1914.
Barnes, H. L. and Fulton, F. T.: Boston Medical and Surgical Journal, June 12, 1913.
Burns, E. H.: New Mexico Medical Journal, January 1915.
Chadwick, H. D.: Boston Medical and Surgical Journal, September 17, 1914.
Dunham, K. and Rockhill, C. S.: Journal American Medical Association, September 13, 1913.
Fehleisen, F. and Rotschild, M.: California State Journal of Medicine, September, 1913.
Fishberg, M.: New York Medical Record, January 2, 1915.
Floyd, C.: Boston Medical and Surgical Journal, November 13, 1913.
Gekler, W. A.: Journal Indiana State Medical Association, October 15, 1912.
Gray, E. A.: Illinois Medical Journal, October, 1913.
Hamman, L. and Sloan, M. F.: Bulletin Johns Hopkins Hospital, February, 1913.
Harris, S. T.: Journal of Medical Association of Georgia, August, 1912.
Kessel, L. and Taschmann, M.: Archives Internal Medicine, August 15, 1914.
King, H. M. and Mills, C. W.: American Journal of Medical Sciences, September, 1913.
Kingsley, C. R., Jr.: New York Medical Journal, September 26, 1914.
Lapham, M. E.: American Journal of Medical Sciences, April 1912.
Lemke, A. F.: Journal American Medical Association, October 14, 1899.
Lyon, J. A.: Boston Medical and Surgical Journal, September 17, 1914.
Mace, L. S.: Journal American Medical Association, March 13, 1915.
Matson, R. C.: Northwest Medicine, January and August, 1914.
Montgomery, C. M. and Speese, J. F.: Pennsylvania Medical Journal, February, 1914.
Murphy, J. B.: Journal American Medical Association. July 23, 1898.
Saugman, C.: International Centralblatt, January 1914.
Schwatt, H.: Transactions Eleventh Annual Meeting National Association for the Study and Prevention of Tuberculosis.
Schaye, M.: Journal American Medical Association, March 21, 1914.
Shortle, A. G. and Peters: New Mexico Medical Journal, January 1915.
Voorsanger, W. C.: Journal American Medical Association, May 9, 1914.
Webb, G. B., Gilbert, G. B., James, T. L. and Havens, L. C.: Transactions Tenth Annual Meeting National Association for the Study and Prevention of Tuberculosis.
Zink: International Centralblatt fur gesamte Tub. Forschung, January, 1914.

ARTIFICIAL PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS

A CLINICAL STUDY OF EIGHTEEN CASES

By C. H. Vrooman, M.D.

Kamloops, B. C.

The object of this paper is to give a brief account of our clinical experience at Tranquille with the treatment of pulmonary tuberculosis by compression of the lung with artificial pneumothorax in a series of eighteen cases. The literature on this subject during the past two years has been very extensive, and I cannot hope to add any original observations to those already made, but possibly a reiteration of some of them may serve as a text for discussion on this important method of treatment. The selection of cases, results obtained, and obstacles to be overcome in the use of artificial pneumothorax are still too much in the formative stage for any one to be too dogmatic. It is through correlating the experience of many independent observers under different circumstances that we can hope to ascertain the true place of this procedure.

Artificial pneumothorax was first used by us at Tranquille in December 1913, and since that date we have tried to give 18 patients this treatment. The apparatus used was a modification of the Floyd-Robinson apparatus, and described in the *Journal of the A. M. A.*, March 21, 1914.[1]

We were forced to make our own apparatus as a matter of economy, and have found it to work quite satisfactorily. At first we used nitrogen gas obtained by abstracting the oxygen from the air by progallic acid and potash solution. However after reading the research work of Webb and others[2] we came to the conclusion that sterile air would be quite as good and less troublesome, and for some months past we have been using sterile air. Our results have been quite as good and we have not found that we had to make refills any oftener. We unfortunately have no *x*-ray apparatus at the Sanatorium, so that we were not able to check up our findings by this means.

The technique has been that most commonly used, viz:

First: Sterilization of the skin with tincture of iodine.

Second.—Injecting 4 per cent. novocaine as a local anesthetic. The important point here is to inject the novocaine deeply, so that the parietal layer of pleura is anesthetised as well as subcutaneous tissues.

Third.—Puncturing the skin with a sharp thin-bladed knife.

Fourth.—Inserting the blunt Floyd needle.

With practice we have found that one could tell when the needle had passed through the parietal pleura by the slight popping sound heard, like sticking a needle through a tense piece of cloth. The site of injection has been by pref-

erence the 4th or 5th inter-space in anterior or mid-axillary lines, though sometimes it has been found necessary to go much farther back.

Fifth.—After withdrawing the stylet of the needle to get a proper fluctuation in the manometer. This is the crux of the whole proceeding. Once a proper fluctuation is obtained the rest is easy. In favorable cases, at the first injection slight withdrawal of the needle, and with very little manipulation, a good fluctuation was obtained almost at once. It has averaged from negative 2 cm. to negative 4 cm. (water). In unfavorable cases—i.e., ones in which there were many adhesions, often required prolonged manipulation, and then only a very slight fluctuation 0 to ½ was obtained. Several times we punctured the lungs during our manipulation. Beyond the spitting of a little blood-streaked sputum it did no harm. After getting a fluctuation the gas or air may be allowed to flow in at the rate of about 100 c.c. per minute. Manometric pressure being taken after every 100 c.c.

Refills.—The average amount injected at the first operation was 734 c.c. The highest quantity was 1200 and the lowest 195 cc. In the earlier cases, as much as 1000 to 1200 c.c. were injected at the first sitting, and though the patient showed no subjective symptoms at the time, yet, we found symptoms sometimes developed within an hour or two, and now I consider 500 to 600 c.c. quite sufficient for the first injection. At subsequent refills the sensations of the patient have been our best guide. Severe pains, shortness of breath and sensation of tightness or coughing, are all signs showing that enough had been injected. Even in the absence of sensations we have found that when pressure in the manometer went to about 4 or 6 cm. positive water pressure it was time to stop as we were liable to have subcutaneous emphysema if more were injected. This, while not a dangerous complication is unpleasant. During the injection a number of our patients complained of pain in the shoulder. This was due to stretching of diaphragmatic adhesions, and is an excellent example of referred pain as pointed out by James McKenzie.[3] In attempting to give this treatment to cases in which there were many adhesions and considerable fibrosis we have met with great difficulty. In some cases in which we had been able to get 500 to 700 c.c. of gas in the first time and which showed on examination a partial pneumothorax, we were greatly disappointed in that we had as much, if not more, difficulty with the refills.

In a number of these, classified below as group two, we have secured a fair fluctuation, from zero to ½ or even 1 cm., and proceeded to allow the gas to flow in. On testing it from time to time we found no change in the fluctuation, and even as when in one case we allowed 3000 c.c. to flow in, the patient noticed no increasing tightness or any symptoms whatever. The only explanation of course is, that the gas escaped into the parenchyma of the lung, either through puncturing a cavity or small bronchus. I have never seen any harm result from this, in fact the patients often assert that they felt better because of the large amount of gas they were able to take. We have given in all 202 injections, and in one case we had symptoms of pleural reflex. The patient stopped breathing and went into a state of collapse, lasting one or two minutes, another patient vomited after each injec-

tion, but the reason in both these cases was putting in too much gas at one sitting. From my experience I would say that it is rarely advisable to give more than 700 to 1000 c.c. of gas at one sitting, unless it is necessary to get a rapid collapse to stop haemoptysis. Pleuritic effusion has been diagnosed in three of our cases. It has possibly been present in more, as in one case it was discovered by *x*-ray examination while the patient was away at the neighboring town, and had been entirely overlooked in our physical examination. The quantity was small, and possibly if all our cases had been systematically screened we would have found more effusions. It developed in each case after the patient had been treated for some time.

Cases Treated. The cases we have attempted to treat by pneumothorax may be divided into three groups.

Group 1, 3 Cases. Far advanced febrile cases with bad prognosis. The disease being mostly confined to one side, but some involvement of the other lung. We treated three of this type. In all of them the prognosis was absolutely bad. One had only one injection and refused to go on. He died two months afterwards. Of the other two one a partial, and the other a good pneumothorax was obtained. One died in two months, the other in eight months. Both claimed that their symptoms were better after treatment, but I do not think the treatment hastened or delayed the inevitable result.

Group 2, 8 Cases. These were far advanced long standing chronic cases, mostly non-febrile. In this group the cases were those in which there was extensive involvement of most of one lung with long standing cavity. The other was involved but had undergone considerable fibrosis. They had all been under sanatorium treatment for a long time, some of them for years. Their condition had in each case been stationary for a long time under ordinary sanatorium life. The pneumothorax treatment was given with the hope that the outlook of a life of chronic invalidism might be changed into one of at least partial usefulness. That this hope was not realized in these cases is one of our great disappointments in this treatment. The average time from onset of the disease to the time of doing pneumothorax on these cases was 42 months. They were all difficult to treat on account of adhesions and the general fibroid condition of the lung. In three a good pneumothorax was obtained, in five a partial one, and in one we could not find the pleural space. In three there was partial benefit. Symptoms of cough and sputum being lessened, but no marked improvement in their general condition. In the five in whom a partial pneumothorax was obtained after six months treatment in none could signs of a pneumothorax be found. Their condition was practically the same as when the treatment has been started. The air had escaped into the parenchyma of the lung either through rupture of adhesions or punctures made at refills. I could not see that the treatment had done them any harm and they were all rather disappointed when the treatment was discontinued. These old standing cases are not likely unfortunately to be benefited by this treatment. Adhesions and general fibrosis hinder collapse of the part of the lung we want collapsed, and should one obtain a partial pneumothorax it is the remaining healthy lung tissue which is collapsed, rather than the diseased area. However I still think it worth trying to get a collapse in these cases in which the disease is unilateral, as occasionally a case in which a good collapse is obtained, will improve considerably, and a bad prognosis modified if not absolutely changed. If though, after two or three refills it is still difficult to find the

pleural cavity and signs of collapse are not marked it is hardly worth while persisting.

Group 3, 6 Cases. This is the most encouraging group of the series. They were all except one far advanced cases, but the onset had been recent. The average time since onset of the disease to the time of inducing a pneumothorax was 7.8 months. The disease was more active than in group two, as indicated by moist rales, rapid pulse, and slight rise of temperature. It was not so extensive, and as far as I could tell there was very little fibroid change. In all this group a good pneumothorax was easily obtained and refills were made without any trouble whatever. Every one of this group showed marked symptomatic improvement, and all but one improved in their general condition, as denoted by gain in weight and ability to take exercise without rise of temperature. One has been under treatment 16 months, two, eleven months, and they have shown such marked improvement that a bad prognosis has been changed to a good one, and we can be hopeful in each case of permanent arrest of the disease. The others have only been under treatment from four to six months, but they are all showing marked improvement. Their improvement has been more rapid with pneumothorax than it was under exactly the same conditions without it.

Our experience in this group may be illustrated by one typical case. Dr. A. R. G. Male, age 25; occupation, physician; had always good health until onset of present illness. Onset of illness, December 1st, 1913, with rather severe haemoptysis. Admitted to the Sanatorium January 14th, 1914. Weight, 120 lbs. Temperature, average p. m. 99.4; pulse 90. Examination of chest showed: Right, consolidation of upper lobe and infiltration of upper part of mid-lobe. Left, thickened pleura at the apex and some fibrosis, probably due to an old lesion. There was also a suspicion of some laryngeal involvement. The patient did well for a time under sanatorium treatment, but then had another haemotypsis in April, developed an afternoon temperature of 100 and examination of chest showed extension of the disease. In June, after 5 months sanatorium treatment, practically a bed patient all the time, the patient showed upper two-thirds of right lung involved, with signs of cavity in upper lobe. There were a few fine crepitations at left base. He also developed a fistula in ano which was discharging quite freely. June 26th, 1914, artificial pneumothorax was done on the right side. There was no difficulty in finding the pleural cavity and a fluctuation of negative 2 cm. to negative 4 cm. was obtained at once. 850 c.c. of gas was injected the first time. Six days later he was given 1100 cc.; twelve days later 1250 c.c. and in two weeks 1500 c.c. There was evidence of a good collapse and since then he has received refills of from 600 to 900 c.c. at four to six weeks intervals. He showed marked improvement from the beginning, temperature became normal, he had no more hcamoptysis except on two occasions slightly streaked sputum. In January last his condition was so far improved that he was operated on for the cure of the fistula in the ano. He took the anesthetic well, stood a rather extensive operation well. Since then his improvement has been rapid. At present date his general condition is good, temperature normal, pulse 90, weight 130 lbs. (his normal weight) and a gain of 10 lbs. There is a good collapse of the right lung, *x*-ray examination though showed a slight amount of fluid.

I have given a rather lengthy account of this patient as I consider this the type of case in which we are likely to get good results from pneumothorax

treatment. My regret in this case is that we did not compress the lung at the beginning.

To draw conclusions from so limited a number of cases is somewhat dangerous, and it would be absolutely unfair to judge the merits of the treatment from the results obtained from these 18 cases. Of the first 12 of the series—9 were failures and only 3 showed partial benefit. This was because they were long standing cases in which there was an absolutely bad prognosis, anyway. To obtain good results, we must, I am convinced, use this treatment in those of recent origin.

The moderately advanced case of recent onset, with the disease confined almost altogether to one side is the type of case on which we should do a pneumothorax at once. Many of these progress rapidly, and at the end of 6 months must be classified as far advanced, so that by the use of artificial pneumothorax we have a most valuable adjunct to our treatment. Incipient cases with severe haemoptysis should also be treated by pneumothorax at once. In so many of these there is such a rapid extension of the disease after haemoptysis that it is better to give them the benefit of this treatment. I cannot go as far as some and advocate that all incipient unilateral cases be treated, as our results with ordinary sanatorium treatment are good anyway. My great complaint is, like that of all men in sanatorium work, that so few of these cases are sent for treatment. On the other hand my experience does not encourage me to hope for much benefit from pneumothorax in the far advanced long standing cases. I would distinguish here the far advanced case which has recently become so, and the one in which the disease has been of some years standing. A case of recent onset in which from physical signs we must classify as far advanced, but who from general condition is still moderately advanced is eminently suited for pneumothorax, provided of course the disease is mostly unilateral.

Artificial pneumothorax is then a valuable addition to our methods of treating tuberculosis, but infortunately its application is restricted to not more than 5 per cent. of cases which have come under my observation.

REFERENCES

1. Vrooman, C. H. and Wittich, F. W.: Apparatus for producing artificial pneumothorax, Journal of American Medical Association, March 21, 1914, vol. lxiii, p. 929.
2. Webb, Gerald B., Gilbert, G. Burtan., James T. L., Havens, Leon C.: Artificial pneumothorax with report of gas analysis to determine the use of air nitrogen, The Archives Int. Med., Dec., 1914, xiv, 883.
3. MacKenzie, Jas.: Symptoms and their interpretation, 1909, p. 209.

A CLINICAL REPORT ON SIXTY-NINE CASES TREATED BY ARTIFICIAL PNEUMOTHORAX

By Herman Schwatt, M.D.
Edgewater, Colorado

The considerations upon which the application of artificial pneumothorax are based, the technique, indications and contraindications, have been so thoroughly discussed in the extensive literature on the subject that I shall mention them only in so far as is necessary to explain certain clinical phenomena and complications in the course of treatment.

In all cases reported on the Forlanini puncture method has been employed. The apparatus and needle used differ in no fundamental respect from others put forward as being best suitable for the operation. Special emphasis has been laid upon a thorough asepsis. A preliminary hypodermic of morphine I no longer consider necessary except in cases of severe cough or considerable nervousness, provided the site of puncture is thoroughly anesthetized down to the pleura. Oxygen has invariably been used for the first insufflation, and frequently in one or two subsequent insufflations where high pressure has been employed or where the readings have not been perfectly typical of a free pleural space. For some time past filtered air instead of nitrogen has been used for re-insufflations, and so far no indications have been found that re-insufflations are more frequently necessary or that any other reasons exist for a preference of nitrogen over air. Neither oxygen, air, or nitrogen are permitted to flow in until undoubted manometric readings indicate that the point of the needle is in a free pleural space. The increase in pressure under the insufflation of gas is the only certain proof that the needle is in a free pleural space. It is by a strict adherence to this rule that serious accidents, and especially gas embolism, can be avoided. In a series of 1137 punctures and 891 insufflations, no serious or alarming complications have been met with. In several cases (6) a condition of moderate shock (?) evidenced by pallor, faintness, rapid, weak pulse, vertigo, and nausea, of short duration and at no time serious, was met with. I do not believe that this condition was due either to a so-called pleural reflex or to mild degrees of air embolism. It seems to me that it was due to an intolerance to the morphine (one-fourth grain), given about a half hour before the operation. With the discontinuance of the preliminary morphine and with a decrease in the dose (one-sixteenth to one-eighth grain) I no longer meet with this complication.

A thorough and comparative study of physical and *x*-ray findings was made in all cases and the induction of a pneumothorax was undertaken after a more or less prolonged period of observation and a balancing of all the factors in each case, such as duration of disease, previous treatment and result, intensity and extent of disease, the probable prognosis, and a con-

sideration of the social and economic status of the patient. The patients were always made acquainted with the possible dangers of the treatment and with the fact that months and sometimes years may elapse before palpable results are obtained.

The treated lung was the right in 49 cases and the left in 20 cases. Saugman calls attention to the fact that the left lung is the predominating seat of extensive, severe unilateral affections. In 54 cases reported by him the left lung was treated in 43 and the right lung in only 11 cases. In a series of 110 cases reported by Zink the right was treated in 49 and the left in 61 cases. In a recent report of 57 cases by Zinn and Geppert the right was treated in 27 and the left in 30 cases. Some observers have reported a predominating number of right-sided cases, the proportion being similar to that found in the writer's cases.

The treated lung was involved practically in its entirety in all cases, cavity on physical examination being present in 55 cases. The untreated lung was involved in 63 cases, negative as to physical findings in 4 cases. In one case the treatment was undertaken for lung abscess and in one for bronchiectasis. In 26 cases there was inactive or slightly active involvement of the upper lobe of the untreated lung; in 24 cases the upper half of the upper lobe, or the apex, was involved; in 3 cases there was moderate hilus involvement (*x*-ray), and in 10 cases the extent of the disease in the untreated lung really contraindicated treatment and was undertaken either as an ultimum refugium or for the relief of severe symptoms which were ascribed to the more diseased lung. The complications met with were:

Beginning infiltration of the larynx	17 cases
Slight degree of ulceration of the larynx	2 cases
Tuberculous middle ear disease	1 case
Tuberculosis of bladder wall	1 case
Beginning Pott's disease	1 case

The ages of the patients treated were:

Below 15	1 case
15–20	11 cases
21–25	28 cases
26–30	18 cases
31–35	2 cases
36–40	5 cases
Over 40	4 cases

The duration of disease was:

Less than 1 year	13 cases
1–2 years	21 cases
2–3 years	16 cases
3–4 years	8 cases
4–5 years	2 cases
Over 5 years	9 cases

The question of the possibility of determining beforehand whether a free pleural space is present must be answered in the negative. There are certain physical findings which may be considered as indicative. Of these, consider-

able importance is attached to free mobility of the lower lung border. That this is not always a positive indication is evidenced by failure to find a free pleural space in cases where mobility is normal and by the ease with which a pneumothorax is established in some cases where this phenomenon is very much impaired or entirely absent. Litten's sign has not been found to be of any value in determining the presence or absence of an obliterated pleura. Fibrosis of the lung with contraction of the chest wall, displacement of the mediastinum and high position of the diaphragm, if marked, indicate obliteration of the pleura, but here too we meet with surprises in the ease with which a pneumothorax is established in some of the cases. The occurrence of a previous pleurisy with or without effusion does not necessarily preclude the possibility of establishing an effective collapse.

In suitable cases one should persist in making trial punctures in many positions of the chest wall. In my earlier cases more punctures were made before attempts were given up than at present. This is the result of a belief that with experience, the condition of the pleura may be fairly definitely diagnosed in the act of puncture and that rarely do we obtain an effective collapse in cases requiring a large number of punctures to obtain a pleural reading. The manometric readings in these cases as a rule indicate extensive adhesions or more or less complete obliteration. A history of previous pleurisy was recorded in 49 out of 66 cases, and in 32 of these a partial or fairly complete pneumothorax was obtained. Of the 15 cases in which there was no history of a previous pleurisy, collapse was obtained in 8. It does not appear that a history of pleurisy has any definite bearing either on the case of entrance or the degree of collapse obtainable.

Mobility of the lower border was absent in 25 cases and attempts were given up in 14 of these as follows:

After 1 puncture	3 cases
After 2 punctures	4 cases
After 5 punctures	2 cases
After 6 punctures	2 cases
After 7 punctures	2 cases
After 12 punctures	1 case

In 4 a partial pneumothorax, and in 7 cases a fairly complete pneumothorax was obtained, a free pleura being found on the first puncture in 8 cases and on the second in 3 cases.

The mobility was recorded as slight or very much impaired in 25 cases. In 4 of these no free pleura could be found after 1 puncture in 1 case; 3 punctures in 1 case, 8 punctures in 1 case and 9 punctures in 1 case. In 14 a partial and in 7 a fairly complete pneumothorax was obtained as follows:

On the first puncture	15 cases
On the second puncture	2 cases
On the third puncture	3 cases
After 7 punctures	1 case

Free normal mobility was present in only 10 cases. In 2 of these a free pleura was not found after 5 and 6 punctures; in 4 a partial pneumothorax

was obtained, the pleura being entered after 2 punctures in 3 and after 1 puncture in 1 case. In 4 cases a complete pneumothorax was established, the pleura being entered on the first puncture. From the above it would appear that the number of partial or complete collapses obtainable have no very important relation to the presence or absence of mobility of the lung borders.

Fibrosis and contraction of the chest was present in 24 cases as follows:

	No free pleura	*Partial collapse*	*Fairly complete collapse*
Slight	..	4	3
Moderate	6	5	2
Marked	4	..	..

Displacement of the mediastinum was present in 32 cases as follows:

	No free pleura	*Partial collapse*	*Fairly complete collapse*
Slight	4	8	3
Moderate	2	4	1
Marked	6	2	2

Cough was severe in 42 cases, moderate in 19 cases and slight in 5 cases. Expectoration was not recorded in 4 cases, up to 1 ounce in 3 cases, up to 2 ounces in 16 cases, up to 3 ounces in 15 cases, and over 3 ounces in 28 cases. Various degrees of hemoptysis was present in 32 cases and absent in 34 cases. Moderate or severe or long-continued hemoptysis was the important factor in undertaking the treatment in 11 cases.

Fever was present in 47 cases; continually high in 23, occasionally high in 16, slight in 8 cases. It was absent in 19 cases. The average pulse was below 90 in 26 cases, between 90 and 110 in 36 cases and above 110 in 4 cases. Other symptoms noted were continuous loss of weight in 23 cases, night sweats in 11 cases, marked gastric disturbances in 9 cases. The general condition and nutrition were unfavorable in 31 cases.

The location of puncture was usually between the anterior and posterior axillary lines in the fifth, sixth, and seventh interspaces. The amount of gas insufflated on the first puncture did not as a rule exceed 500 c.c. except in cases where it was desired to collapse the lung rapidly on account of hemoptysis. On re-insufflations the maximum amount was 1000 c.c. The amount of gas insufflated and the degree of pressure permissible varies with the presence of adhesions and the resistance of the mediastinum. The subjective symptoms of the patient such as pain and pressure and the manometric readings serve as the principal guide in the amount of gas insufflated. The operation should be discontinued on complaint of these symptoms irrespective of the amount of gas or the manometric readings. In the normal cases it is the aim to obtain a slightly positive pressure. Re-insufflations are made at first every other day, then twice a week; later on once a week, once in two weeks, etc., until, in cases where an effective collapse has been obtained, they are necessary only once a month and even less frequently. In some cases there is a tendency to a rapid absorption of the gas and in others more frequent insufflations are necessary in order to keep up the desired degree of collapse on account of the pathological condition of the lung itself. In general the collapse should be

produced gradually so as not to place too much compensatory work on the untreated lung too rapidly. Frequent Roentgen ray control of the extent and nature of the collapse and constant watchfulness over the untreated lung are perhaps the most essential features in the successful carrying out of pneumothorax therapy.

Pain, moderate to severe, was observed in 23 cases. In 1 case, on the first puncture, a typical pleural reading was obtained but no gas was insufflated on account of immediate severe pain and pressure and marked difficulty in breathing; the same happened on the second puncture and was even more marked. The same occurred in another case on the first puncture. In another case there was severe pain, marked difficulty in breathing on the second insufflation, requiring several doses of morphine. A fairly complete pneumothorax was obtained in these cases. Pressure symptoms were observed in 4 cases. In many of the cases in which attempts were given up after the insufflation of small amounts of gas there was always pain and pressure when the readings became strongly positive. Emphysema of various degrees was noted in 24 cases. In 10 it was slight, in 4 moderate, and in 10 cases extensive. Subcutaneous emphysema becomes rapidly absorbed and is of no serious import. Deep emphysema occasionally may give rise to unpleasant symptoms, but it is also not to be looked upon as a serious complication. Emphysema is usually the consequence of cough following an insufflation, especially when the gas is under considerable pressure and in cases with extensive adhesions. It may be partly avoided by massage of the location of the puncture after the needle is withdrawn and by applying pressure in cases of severe cough. It is stated (Saugman) that effective collapse is rarely obtained in cases developing deep emphysema extending into the neck. This was observed in 5 of my cases. In 1 case of abscess of the lung the emphysema extended to the opposite side, to the neck, and around the region of the occipital bone and down the arm on the treated side to the wrist. A fairly complete pneumothorax was obtained. In another case considerable difficulty in breathing was associated with the neck emphysema—partial collapse. In the third case the emphysema extended up to the clavicles on both sides and to the lower part of the abdomen—slight collapse. In another case the neck emphysema caused marked difficulty in swallowing—partial collapse. In 1 case the emphysema extended into the neck and was marked in the region of the groin and the scrotum—fairly complete collapse. In another case of neck emphysema the collapse was slight. In left-sided cases gastric disturbances were occasionally observed after insufflations, ascribed to pressure upon the stomach.

RESULTS

For convenience of study the cases have been divided into the following groups:

Class A (1).—Twenty-three cases in which a pneumothorax could not be induced on account of either complete obliteration of the pleura or such extensive adhesions as to make it highly improbable that an effective collapse would be obtained. In 11 of these cases no readings were obtained after

repeated trials. In the others varying small amounts of gas were insufflated and attempts subsequently given up on account of strongly positive pressures associated with pain and pressure in the chest after the insufflation of very small amounts of gas. In 1 case a pleural reading was obtained on the first puncture but was associated with such severe pain and alarming difficulty in breathing that no gas was insufflated. A second puncture was also followed by severe pain lasting for about 2 weeks. Further attempts were given up. In another case a negative reading was obtained on 2 punctures and each time the pressure was so highly negative that the fluid in the manometer rose instantaneously and rapidly, threatening to overflow into the tube leading to the needle. In this case there was extensive cavity formation and the *x*-ray showed a diffuse shadow over the entire side and darker areas indicating large cavities. Further attempts were given up.

Class A (2).—Eight cases in which treatment was discontinued on account of the hopelessness of obtaining an effective collapse, no effect upon the course of the disease in cases where a partial collapse was obtained, and on account of other complications. In 1 case further treatment was refused on account of severe pain after the first insufflation of 400 c.c. with a final reading of -26 -3. In 1 case 24 insufflations were given over a period of 5 months without obtaining an effective collapse or producing any effect upon the symptoms; extension of the disease in the untreated lung took place. In another case 45 insufflations over a period of 17 months resulted in a partial collapse without sufficient effect upon cavities in the upper lobe to justify continuation of treatment. In the other cases treatment was discontinued on account of increase in the severity of symptoms and extension of the disease on the untreated side. In none of the latter cases more than a slight pneumothorax was obtained and the unfavorable results could not be ascribed to the treatment.

Of great interest is the question of what shall be done in the cases suitable for the treatment yet in which a pneumothorax cannot be established on account of complete or partial obliteration of the pleura. I believe that in such cases the more radical and more purely surgical procedures which aim to produce a collapse of the lung are justifiable. I refer particularly to methods of rib resection of Friedrich and Wilms, and extrapleural pneumolysis with or without plombierung. The subsequent history of the writer's cases in which the attempts to produce a collapse had to be given up would certainly warrant these proceedings.

Class B.—Five cases in which treatment was undertaken as an ultimum refugium and as a palliative measure, and no favorable or lasting results were expected. In this class should also be included 2 cases complicated by effusion and reported under Class C. One case died, 2 cases were unimproved; in 1 case the treatment was undertaken for the relief of severe hemoptysis upon which it had the desired effect—general condition unimproved; in 1 case treatment by urgent request of the patient as an ultimum refugium—still under observation, prognosis unfavorable.

Class C.—Thirteen cases complicated by effusion. The question of the etiology of effusions complicating artificial pneumothorax and that of infection

of a previous serous effusion cannot be taken up within the scope of this report except to say briefly, that infection from without may be disregarded as an important factor; that it probably takes place from within as the result of an extension of a tuberculous focus to the visceral pleura, an event which in cases where the lung is apposed to the parietal pleura, results in adhesions. It is more likely to result in cases with extensive ulcerative processes in the lung and in run-down cachectic cases. In several of the cases the onset of the effusion was believed to have been connected with undue exertion on the part of the patients. Several observers do not regard the occurrence of effusion as a serious complication. The writer considers it always as an unfavorable event, since it retards the treatment and makes it more difficult and above all, because of the ever-present danger that a serous effusion may become converted into a pyothorax.

The clinical history of the effusions may be gathered from the following:

In second month of treatment: case of lung abscess became purulent; exitus about 3 months after first insufflation.

In second month of treatment: became purulent, exitus about 1 year after appearance of effusion. Treatment undertaken as ultimum refugium.

In third month of treatment: had remained serous 6 months later. Withdrew from observation; unimproved.

In second month of treatment: became purulent and 22 months later had become completely absorbed and lung re-expanded; unimproved.

In seventh month of treatment: had remained serous and present 1 year later; apparently arrested.

In seventh month of treatment; had remained serous 1 year later; unimproved.

In seventeenth month of treatment: had remained serous 4 months later; improved.

In seventeenth month of treatment: serous and completely resorbed within 1 month; apparently arrested.

In thirteenth month of treatment: serous and completely resorbed 2 months later; apparently arrested.

In third month of treatment: serous, completely resorbed with re-ëxpansion of lung 1 year later; apparently arrested.

In thirteenth month of treatment: has remained serous 4 months later; unimproved.

In first month of treatment: serous; no interference and further treatment discontinued on account of rapid decline which, on account of very slight collapse cannot be ascribed to the treatment. Fluid resorbed.

In eighth month of treatment: serous and resorbed in 2 weeks; quiescent.

In all cases except one the onset of the effusion was marked by a rise of temperature; pain connected with the appearance of fluid was present in 8 cases. Aspiration of the fluid was practiced in 7 cases, of which 2 became purulent, in 2 the fluid was completely resorbed, and in 3 there was continuous reaccumulation. Of the 6 cases which were not aspirated, the fluid became purulent in 1 case (lung asbcess), was resorbed completely in 3 cases, and remained the same in 2 cases. The degree of collapse was slight in 1

case, partial in 3 cases, fairly complete, with bands of adhesions, in 5 cases, and complete in 4 cases. The degree of the effusion was slight in 1 case, moderate in 7 cases, and large in 4 cases. In 5 cases microscopic examination showed tubercle bacilli. In 8 it was negative. In 2 cases positive on microscopic examination, animal inoculation proved negative. In 1 case it was positive by both methods and in 1 case negative by both. The guinea pigs were killed 6 weeks after inoculation.

Class D.—Three cases in which treatment was begun elsewhere. One case presented a fairly complete pneumothorax in which an effusion developed which later became purulent and resulted in an empyema necessitans; prognosis bad. Another case presented a complete pneumothorax with a large effusion, serous in character. The third case received insufflations for 7 months and presented, after the last insufflation, no physical or roentgenologic signs of collapse.

The effect of artificial pneumothorax upon symptoms and complications depends upon the degree of collapse, upon the previous condition of the untreated lung and the effect upon it of the treatment. The more nearly healthy the untreated lung and the more complete the collapse, the more certain the beneficial and lasting effects. The effect upon the pathologic condition of the lung itself depends upon the character of involvement and the length of time the collapse is maintained. The number of cases meeting the ideal indication for pneumothorax; i.e., extensive, strictly unilateral disease or extensive disease of one side with slight inactive involvement of the other lung, is small. Thus Courmont found only 31 cases out of 352 suitable for the treatment and in only 16 was it possible to carry it out. The supposition that collapse of one lung produces a favorable and curative effect upon the existing disease in the other lung has not as yet been definitely established. The indication for pneumothorax still remains the most delicate point and statistics of reported cases do not throw any definite light on the subject. It cannot be denied that brilliant results are obtained in cases in which there is considerable disease of the untreated lung and even in cases in which but a partial pneumothorax is obtained. The question, however, must be asked and answered how long these results last and as to the ultimate fate of these cases. When the treatment is undertaken as an ultimum refugium and for palliative purposes only and with a full knowledge of the patient as to the object to be achieved, every favorable effect upon the symptoms may be looked upon as a gain not to be achieved by any other form of treatment. But for curative purposes the indications must be strictly limited. If pneumothorax therapy is based upon rational principles, and from experimental and practical experience it appears to be so, then the future of it for curative purposes lies in applying it in cases not in the extreme stages of the disease, not after one lung is diseased in its entirety with cavity formation and with involvement of the other lung, but in earlier cases, moderately advanced and even in incipient rapidly progressive cases and before such obliteration of the pleura has taken place as to prevent an effective collapse and thus increasing the risks of the treatment. The principal objection to the application of pneumothorax therapy in earlier cases is the question as to

whether healthy lung tissue, after being subjected to long-continued collapse is capable of taking up its function when reëxpanded. From practical experience it would appear that it can, although some observers deny this possibility upon experimental grounds. It is questionable whether in a disease which holds out so little hope for cure we are justified in waiting and whether it is not better even to sacrifice a partly healthy lung for the purpose of obtaining a cure of the pathologic process. The accidents and complications should not deter us from undertaking the treatment in earlier and more favorable cases.

In favorable cases the effect of the collapse becomes more and more evident with every insufflation by a reduction of temperature, lessened cough, and expectoration and improved general condition. The duration of the treatment, it is agreed, should be prolonged, in mild cases from 6 months to a year and in severe cases for several years. Forlanini recommends that it be kept up indefinitely. In permitting reëxpansion the lung should be carefully watched for signs of activity and the pneumothorax should not be allowed to become obliterated until all active signs have completely ceased. Personally, I should prefer to keep up the collapse for an indefinite period of time. The longer the lung is kept compressed the more complete the fibrosis of the lesions and the less danger of recurrence.

For the purpose of studying the good or ill effects of the treatment, 27 cases (10 in Class C and 17 in Class D) are available. In these cases a sufficient degree of collapse was obtained and was kept up for a sufficient period of time to permit us to judge of its influence upon the course of the disease. In this series of cases is included 1 case of lung abscess complicated by effusion which became purulent; exitus in third month of treatment. Another case, of bronchiectasis, in the sixth month of treatment, resulted in a marked decrease in cough and expectoration. There has been no rise in temperature and no hemoptysis and the patient who previously was a burden to herself and surroundings on account of profuse, foul-smelling expectoration, is now working, the offensive odor having completely disappeared. In 1 case of this series there took place a lighting up of a slight quiescent process in the untreated lung with a partial collapse resulting in exitus in the fifth month of treatment, complicated by tuberculous pneumonia. Excluding the cases of bronchiectasis and abscess, we find the duration of the disease before treatment was begun to have been:

Less than 1 year	7 cases
1–2 years	11 cases
2–3 years	4 cases
3–4 years	1 case
Over 5 years	2 cases

The duration of treatment was:

4– 6 months	6 cases
7–12 months	5 cases
12–24 months	14 cases

The degree of collapse has been partial in 11 cases, and fairly complete in 14 cases. In all cases there are various degrees and extents of adhesions.

In no single case are adhesions entirely absent. The results may be classified as follows:

Died	1 case
Unimproved	3 cases
Quiescent	4 cases
Apparently arrested	10 cases

Of these cases there have withdrawn from personal observation 2 cases with effusion and 3 cases without effusion. There have remained under personal observation, with effusion, 3 cases; without effusion, 14 cases. The treated lung has been allowed to reëxpand in 2 cases (after 16 and 12 months of collapse). One case is classified as apparently arrested and the other case, an unfavorable one from the beginning and complicated by effusion, as unimproved. In the first case the lung gradually reëxpanded under an effusion of which no trace has remained.

The effect upon cough has been:

	No effect	*Slight decrease*	*Moderate decrease*	*Complete cessation*
Severe	1	1	5	4
Moderate	..	1	1	8
Slight	..	..	..	3

As regards the amount of expectoration there was no effect noted in 2 cases, slight decrease in 1 case, marked decrease in 7 cases and practically complete disappearance in 17 cases. The tubercle bacilli disappeared from the sputum in 11 cases (repeatedly examined by the antiformin methods).

The effect upon temperature was always marked. It fell to and remained below normal or normal in all cases except one. A decided effect in lowering the pulse was observed in 14 cases. In all cases complicated by recurring hemoptysis it ceased after a fair degree of collapse was obtained; in none was there a recurrence. Occasionally slightly blood-streaked sputum was observed after the first few insufflations. There were not observed any unfavorable effect upon the frequency of respiration except in 1 case in which moderate dyspnoea developed and still persists.

The general condition became worse in 2 cases, was improved in 21 and unimproved in 2 cases. There was loss of weight in 5 cases (between 6 and 10 pounds), a gain in 13 cases (4 to 20 pounds), and it remained stationary in 6 cases. Night sweats ceased in all cases. The effect upon the untreated lung was: increased activity and extension in 2 cases and it remained stationary in 22 cases. The laryngeal involvement became worse in 1 case and was improved in 23 cases.

In order to study the effect of pneumothorax therapy except in a general way and to make it of value to the reader it is necessary to study each case individually from all standpoints. In regard to every feature of the treatment and the results obtained every case is a law unto itself. The writer expects in the future to publish a more exhaustive study of his cases, giving each case separately with full clinical data.

The experience of the writer warrants the following conclusions:

1. Pneumothorax therapy is a valuable palliative measure in cases of advanced tuberculosis.

2. It is a curative therapeutic measure in carefully selected unilateral cases with but slight inactive involvement of the other lung and when a complete collapse can be obtained and maintained for a considerable period of time.

3. That the treatment should be undertaken in cases before they have reached a hopeless advanced stage.

4. That at the beginning the treatment should be given in an institution where the patient is under constant supervision.

CLINICAL OBSERVATIONS ON ARTIFICIAL PNEUMOTHORAX WITH REPORT OF 73 CASES

By Ralph C. Matson, M.D.

Portland, Oregon

In the latter part of 1912 artificial pneumothorax was added to the therapeutic procedures utilized at the Portland Open Air Sanatorium. Since that time we have had occasion to resort to the procedure in 73 cases. The material comprises essentially sanatorium cases, carefully observed, and controlled by clinical and roentgenological methods. With the exception of 6, they were typically progressive cases—a great majority with a questionable or absolutely unfavorable prognosis. In no case, excepting the 6 cases referred to, was the method adopted until after a conservative trial of the usual sanatorium treatment. Of the 73 cases:

Twelve were of the severe, acute, infiltrating, and caseous-pneumonic forms of tuberculosis:

5 of these were progressive in spite of treatment; thereupon it was discontinued; all died later.
1 made splendid temporary improvement.
1 case is apparently well.
4 cases were favorably influenced.
1 case is still in doubt.

Fourteen cases were chiefly unilateral, destructive, fibrocaseous tuberculosis, extensive and progressive:

5 cases are apparently well.
In 2 cases the procedure was abandoned on account of adhesions preventing a collapse of sufficient size to justify continuation of inflations; 1 of these cases was temporarily improved.
4 cases are arrested and still under treatment.
1 case is favorably influenced.
In 2 cases the procedure was abandoned on account of recrudescence in the uncollapsed side.

Twelve cases were chiefly unilateral, fibrocaseous, cavernous tuberculosis, stationary, with cavity manifestations in foreground:

In 4 it was impossible to find free pleural space, and numerous attempts resulted in failure.
In 7 adhesions prevented a collapse of sufficient size to justify continuation of inflations.

The 1 remaining case, detailed later, was the only one of this group that enjoyed benefit from treatment.

In 5 cases the operation was undertaken on account of severe and repeated hemoptysis:

In 2 cases adhesions prevented collapse; both died.
The remaining 3 are discussed later.

Four cases had pleurisy with effusion; discussed later.
Seven cases of our series were non-tuberculous lung disease:

1, lung gangrene; no lasting benefit.
2 cases of bronchiectasis were attempted; no benefit was derived by either, owing to the presence of adhesions which prevented collapse.
1 a lung abscess in a diabetic; no success on account of adhesions; later, a phrenikotomy was done with some success.
1 case was done for diagnostic purposes.
1 post pneumonic empyema.
1 abscess due to aspiration of foreign body (the latter 2 are noted later).

Ten cases of our series were bilateral, fibrocaseous, cavernous tuberculosis:

In 1 we failed to locate free pleura.
In 3 treatment was left off on account of recrudescense in uncollapsed lung; all died later; upon one we did a double pneumothorax with temporary improvement.
3 cases are in doubt but still under treatment.
3 cases are improving and still under treatment.

Eight cases were "Ultimum Refugium," desolate, bilateral cases:

In 1 case we failed to locate free pleura.
4 cases enjoyed temporary improvement.
3 cases did not improve. The disease was progressive, in spite of treatment, in each of the 8 cases; all died.

It will be noted that the material consists of an especially large number of desolate cases and a high mortality could be expected as a matter of fact.
Twenty-two cases ultimately died in spite of treatment.
Eight cases were caseous, pneumonic forms with high temperature, profound toxemia and in bad general condition.
One case of lung gangrene.
In 1 case death was due to reactivation of the least affected side.
In 1 case death was due to myocardial degeneration following mumps.
Three cases died of hemorrhage when collapse could not be brought about on account of adhesions.
Eight were desolate bilateral cases with an absolutely hopeless prognosis: Of these:

6 died of enteritis which was present before artificial pneumothorax was begun.
1 case died of spontaneous pneumothorax.
1 case died of tuberculous laryngitis.

The first requisite in considering pneumothorax is the possibility of being able to carry it out, and the first essential is the absence, or nearly entire absence of adhesions—at least old adhesions; and here a history of previous pleurisy is no proof of their existence. Our diagnosis of adhesions at best can be no more than a suspicion. The classical diagnostic procedure to establish lung border excursion, even when controlled with the fluoroscopic screen, does not *with certainty* indicate the presence or absence of adhesions: especially in cases of diffuse lung changes, when the lung border has become involved, the lung excursion can fail through border adhesions and still a good collapse can be brought about; and on the other hand, in spite of lung border excursion, moveable diaphragm and clear *x*-ray plates, adhesions can exist and render collapse impossible. Accordingly, we are duty-bound to attempt compression as long as the *x*-ray or physical examination shows no certain signs of adhesion.

We believe that the physical examination is superior to the *x*-ray in determining the presence or absence of adhesions and site of puncture. Strong weakening of the breathing over the lower lobe; local shortening of the inspiration (Jacquerod's sign); presence of the "Dissoziation symptom" of Kuthy—that is, where the pectoral fremitus is weakened with increased bronchophony over the same dulled area; and the demonstration of diminished lung excursion by percussion, give us important hints of existing adhesions. However, no cases should be selected upon data gathered from physical examination alone.

In the 73 cases we had 7, or 9 per cent. failures to locate free pleura by physical, diagnostic and *x*-ray methods, and several attempts resulted in failure. The remaining 66 cases divide themselves into 3 groups:

Group 1. On account of pleural adhesions, the pneumothorax was too small and gave insufficient improvement to justify continuation of inflations—11 cases or 17 per cent.:

In 6 cases no improvement was noted.
In 5 cases there was slight temporary improvement.

Of the 6 unimproved cases, 4 were chiefly unilateral, fibrocaseous, cavernous tuberculosis, stationary, with cavity manifestations predominating.

Of the 5 cases enjoying improvement, all were stationary cases of fibrocaseous, cavernous tuberculosis, chiefly unilateral; 2 of these cases have continued to improve; 1 remained stationary and, on account of the lower lobe distribution of lesions, we did a resection of the phrenic nerve (phrenikotomy) about one year ago; since then the condition of the patient has much improved. The remaining 2 cases were unchanged for several months, when both developed acute caseous processes with tuberculous enteritis; 1 is hopeless and the other almost so.

That a partial pneumothorax can bring about symptomatic improvement in a tuberculous process, there seems to be no doubt; but that it is lasting (according to our experience) is seldom the case; and results are almost in direct proportion to the size of the pneumothorax.

Long-standing cases of fibroid tuberculosis with cavity formation are not so satisfactory as we are led to believe; not because of the method, however, but on account of the likelihood of adhesions which prevent satisfactory collapse. This type of tuberculosis represented the most difficult cases to obtain a clinically effective degree of compression. Of 12 cases attempted, only one experienced satisfactory results. Success in this type of cases cannot be expected without resort to appropriate surgical procedures, which as yet have not had wide application. Adhesions between lung and diaphragm are the most harmless. Apical adhesions are serious; but the most serious were those attached to the lateral aspects of the chest wall. We have attempted to dissolve these adhesions with fibrolysin, but it has proven valueless. In selected cases the energetic use of nitrogen under pressure will separate recent adhesions; 20 to 30 c.c. H_2O should be the average limit, although a much higher pressure may be used in some cases. We have used as high as + 80 with success in 2 cases. Cases must be carefully studied before resorting to high pressures, avoiding, if possible, old and extensive tuberculosis where caseous areas in the cortex, together with cavities, are always present, representing the source of one of the most frequent complications of the treatment, namely, lung perforation. Gas embolism, hydrothorax and pleural exlampsia are also dangers to be considered in forcibly separating adhesions.

Group 2. Advanced bilateral cases in bad general condition; no lasting improvement, or where the disease was progressive in spite of the treatment and therefore discontinued—19 cases or 26 per cent. In all of these cases except 1, little could be expected and pneumothorax was tried before sending the patients away. The one case referred to, while having extensive, acute disease on one side, had only slight activity on the other; collapse of the worse side was followed by recrudescense in the uncollapsed side; the latter was also collapsed; at the same time, gas was slowly aspirated from the side primarily collapsed, until a moderate degree of compression was attained in both sides; the patient again improved but later developed enteritis and laryngitis; inflations were discontinued.

Forlanini and Fagioli have reported success in desolate bilateral cases, by compressing both sides. We have had occasion to resort to this procedure in 3 other cases noted later.

Six cases of this group made slight temporary improvement:

5 of these had extensive disease on one side and more than $\frac{1}{3}$ of the opposite side affected.

1 had a caseous pneumonia.

Four cases made a marked temporary improvement:

3 of these were extensive bilateral cases.

1 was a case of lung gangrene, complicating a fibrocaseous tuberculosis.

If bilateral cases are done, the disease on the good side must be limited to the upper lobe and not acute; it must be carefully watched and collapse cautiously brought about. Actively advancing and caseous pneumonic forms appear unsuited in the latter; for anatomic reasons, no effectual collapse can be hoped for. Forlanini warns us against it in these forms and reminds us that it is frequently bilateral and should not be used except as an extreme measure, and then very carefully. Bilateral cases with softening on the least affected side, or infiltration in the lower lobe without softening, are likely to be made worse. Isolated lower-lobe tuberculosis, on account of the accompanying bronchiectasis and difficulty of collapse appear unadapted. Cases with a rapid course and severe toxemia do not do well; not only theoretically can little be expected, but in practice this is confirmed. Acute infiltration or inflammatory processes in the non-compressed side of bilateral cases are very likely to be made worse; cases with an old extensive fibrocaseous disease on one side and acute infiltration on the other, are at times misleading.

Not too severe changes (probably limited to infiltration) in the good side seem to be favorably influenced by pneumothorax, but the more severe are, according to our experience, only exceptionally lastingly improved; lesions limited to the apex or extending from the hilus outward, appear most favorably influenced. Lesions of the base of the uncompressed side are likely to be made worse. It is in this class of cases that the *x*-ray renders such splendid service—not only in the selection of cases, but in following the course of the disease, degree of lung compression and safe-guarding the non-compressed side. Circumscribed hilus tuberculosis, characterized by round and oval uniform spots; hilus apex tuberculosis with isolated areas in the apex, with increased peribronchial paths leading to apex, with scattered areas in the apex and upper lobe but isolated in the lower lobe, do not contraindicate compression of the other side. However, if we find in the upper lobe confluent patches amounting to infiltration, bronchopneumonic or destructive processes to deal with, compression is contraindicated.

Group 3. Cases wherein a satisfactory collapse was obtained, some of which are apparently well, others arrested and making good recoveries or very favorably influenced—34 cases or 46 per cent. (Chart A). Of the 34 cases belonging to this group:

13 are apparently well, treatment having been discontinued.
21 are still under treatment. Of this number: 7 are arrested and making good recoveries; 8 are favorably influenced; 6 are doubtful.

Four cases of this group were suffering from pleurisy with effusion complicating a moderately active lung lesion; the fluid was withdrawn and replaced with nitrogen gas; treatment continued from 3 to 5 months; recovery was uneventful, the lung fully expanded in each case.

Seven cases of this group were of the severe, acute infiltrating and caseous pneumonic forms:

1 is apparently well (No. 39).
1 is arrested and making a good recovery (No. 46).

4 were favorably influenced, 3 of which are still under treatment (Nos. 36, 59 and 63); the other after having a normal temperature for 2 months developed a spontaneous pneumothorax which was followed by fatal empyema (No. 15).

1 is doubtful but still under treatment (No. 56).

Twelve cases of this group were chiefly unilateral, destructive, fibrocaseous tuberculosis, extensive and progressive.

5 are apparently well (Nos. 4, 25, 31, 45 and 62).
3 are arrested but still under treatment (Nos. 9, 51, 37).
1 is favorably influenced (No. 32).
2 are doubtful (Nos. 13 and 22).
1 case (No. 7) was a chiefly unilateral fibrocaseous cavernous tuberculosis with cavity manifestation in foreground; the disease was arrested on account of removal to another city; treatment has been continued elsewhere with success.

In 3 cases compression was brought about on account of severe and uncontrollable hemoptysis; in each instance it put a quick end to the bleeding.

Two cases of non-tuberculous lung disease belong to this group:

1 was an empyema following pneumonia (No. 44); the pus was aspirated and replaced with gas repeatedly; the temperature came very quickly to normal; full recovery took place.

1 was a lung abscess (No. 2) due to the aspiration of a foreign body; the patient had raised 500 c.c. sputum daily for one year; complete recovery followed after 7 months compression.

Six cases were bilateral, fibrocaseous, cavernous tuberculosis:

2 have been very favorably influenced.
1 is arrested.
3 are still under treatment but too recent to classify.

COMPLICATIONS

The most common complications aside from mild, subcutaneous emphysema in adhesion cases, was hydrothorax. This occurred but 6 times or slightly more than 8 per cent. of all cases treated, or 12½ per cent. of the 32 cases of this group. Those of the other groups were undoubtedly not under treatment sufficiently long to justify consideration. Ten of the 19 cases of this group still under treatment have had a pneumothorax for more than 1½ years, a few more than 2 years. We are not led so far as to ascribe these probably purely accidental results to some specific healing power of our climate, as I note some of our climate enthusiasts have attempted. I have no doubt if they, and we, wait long enough, the results will be little different from those of European observers, irrespective of geographical position.

For the detection of fluid a fluoroscopic control of the physical examination has been used. In one case fluid appeared after the third month without fever

(no adhesions; case No. 4). The patient was compelled to remove to a distant place where competent medical supervision was not available; his improvement was constant; he returned for examination $2\frac{1}{2}$ years later, believing himself absolutely well, as he had no subjective signs of tuberculosis; he complained only of dyspnoea on exertion, which he attributed to adhesions, as he had not felt fluid for more than $1\frac{1}{2}$ years and presumed it had absorbed and the lung re-expanded. Examination showed the heart to the right of the sternum and the left pleural cavity filled with a sterile chylous exudate containing débris, fat and cholesterin crystals; the pleura was not markedly thickened; the fluid is being withdrawn and partly replaced with gas. In the second case fluid appeared after the sixth month, ushered in with fever (adhesion case); the fluid remained 2 months and absorbed during the patient's absence from supervision, leaving the lung adherent and tremendously thickened; a pressure of 80 c.c. H_2O was necessary to re-establish the pneumothorax. Marked retraction processes, followed by diffuse pleural thickening and diminution of the pleural cavity as a consequence of connective tissue proliferation, occurred in this case; during the past 14 months the cavity has been dry. In the third case the hydrothorax appeared after the third month; was very transient; also sterile. In the fourth case it appeared after the first year, became purulent and contained tubercle bacilli; the patient has since maintained a low grade temperature for many months. The fifth and sixth cases have occurred recently; one in a case under compression 1 year; the other 3 months. Pyothorax as a result of spontaneous pneumothorax, occurred twice; in both cases the cavity filled with a purulent exudate containing tubercle bacilli by direct smear examination; one case was referred to the surgeon and died while a rib resection was being done. The other was treated by aspiration with success; however, as it was necessary for the patient to return home to a remote section, a drainage tube was put in position under local anesthesia; the patient maintains a normal temperature and is greatly improved in every way. Pyothorax as the result of infected hydrothorax, was seen twice; one was sterile, the other tuberculous; both were treated by aspiration with success. Bleeding from the compressed side occurred once and was perfectly controlled by the re-introduction of gas.

Air embolism (an accident that should belong to the early historic period of pneumothorax therapy), occurred once early in our work; the patient was unconscious 25 minutes with a hemiplegia; full recovery took place within one hour.

Pleural eclampsia occurred twice, in both instances on re-inflations of nervous, apprehensive women (one 6 months pregnant); both were adhesion cases, and in both instances it came on after the needle has been withdrawn—one immediately after; the other 10 minutes after. Both cases were characterized by the typical symptom complex. Psychic symptoms, numbness, loss of consciousness, mental confusion, tonic contractions on the pneumothorax side, no loss of bladder or bowel control, no vomiting, rapid pulse, weak and irregular, pale skin with cyanotic spots, especially on face, throat and chest; breathing superficial and irregular; the attacks lasted one-half hour. Recovery without complications took place in both instances; one

case (after a preliminary morphine-atropine injection) has since been reinflated several times without event, using warmed nitrogen gas.

Recrudescense in the uncollapsed side that could be justly attributed to the pneumothorax, occurred three times; in 2 cases withdrawal of the gas caused its subsidence; the other was progressive.

Pleurisy with effusion on the opposite side has occurred twice; both were bilateral cases with a moderately active lung lesion on both sides, complicating a pleurisy with effusion; aspiration of fluid and replacing it with gas brought immediate improvement, and while under compression the opposite side became active with exudate formation, which was also aspirated and replaced with gas, establishing a double pneumothorax. One case was progressive; autopsy showed tuberculous laryngitis, tuberculous pericarditis and tuberculous enteritis; there was no active lung tuberculosis. The other case is still under treatment with a double pneumothorax and is constantly improving.

Of the 32 cases comprising this group, 2 developed tuberculous enteritis after beginning artificial pneumothorax treatment; in one it was progressive; in the other, after persisting for several months, it has subsided.

Thirty cases of this group were tuberculous, and in 22 it was bilateral. Eleven had rales in apex of non-compressed side, but in 8 they disappeared as the case improved. In 12 cases the sputum, which had previously been positive by direct smear, became negative by the method of Ellerman and Erlandsen and entirely disappeared. In 9 cases still under treatment, positive diazo and urochromogen reactions have been converted into a negative, and in nearly every case the Arneth count has shown shifting to the right. Every case of this group gained in weight with 2 exceptions, and here a tuberculous enteritis was at fault. Tuberculous laryngitis was present at the time a pneumothorax was induced in 3 cases; in one it was progressive; two cases have improved.

We have never seen permanent damage to the lung follow compression, although our longest observation, where we have permitted re-expansion, has been after two years' compression.

THE INFLUENCE OF LUNG DISEASE THROUGH ARTIFICIAL DIAPHRAGM PARALYSIS

"PHRENIKOTOMIE"

By Ralph C. Matson, M.D., and Marr Bisaillon, M.D.

Portland, Oregon

In 1911 Stuertz proposed the treatment of severe one sided chronic, particularly cavernous tuberculosis, by resection of the phrenic nerve, in order to put the diseased lower lobe at rest. He based this proposal upon the observation that after cutting the nerve, the diaphragm ascended to expiration position, and showed only slight movement, usually of the paradox type. Brandenheur, Schepelmann and Sauerbruch, clinically and Roentgenologically made the same observation.

It has been claimed as a result of the procedure, we obtain diminished mobility of the lung, compression of the lower lobe, and lessening of the danger of aspiration tuberculosis.

We have 2 cases to report:

Patient No. 1.—Female, age 56, who complained of cough and expectoration for seven years, dating from the time she experienced an attack of lobor pneumonia, right, followed by what was diagnosed empyema.

At intervals of 4 to 6 months since she has experienced haemoptysis, 4 to 6 ounces during each attack. In the interval she raised large amounts of mucopurulent expectoration, from 150 to 300 c.c. Daily 24 hour specimen separating into three layers.

Five years ago she underwent an operation on right side for lung abscess (rib resection, two ribs being partially removed). Since the operation she has continued to cough and expectorate about the same amount as formerly.

Sputum showed no tubercle bacilli either by direct means or by Ellermann and Ehrlandsen procedure.

Urine contained a trace of sugar.

Physical Findings.—Inspection reveals a scar in right axillary base, with retraction, decreased mobility and expansion on right. Percussion evinces fixed lower lung border right. On auscultation was heard a patch of bronchial breathing in right axillary base, accompanied by sibilant and sonorous rales. Weak breathing over entire right side, above, normal vesicular breathing over left side.

X-ray Findings.—Plate shows left field negative.

Right field, apex negative, hilus increased, lower field darkened with increased peri-bronchial thickening; in the center a circumscribed lighter area with clearly outlined darker periphery.

Phrenico, costal sinus obliterated. Under the screen, diaphragm was seen to be fixed.

She was admitted to Portland Open Air Sanatorium April 6, 1914, and after a few days' observation, a pneumothorax was attempted, but this procedure was found impossible on account of adhesions.

Case No. 2.—Female, age 26. Had experienced cough and expectoration for 14 years, fever at different intervals during this time. Had also experienced haemoptysis at two different times; has been raising about 30 c.c. sputum daily for past few months.

Physical examination revealed dullness over left side anterior and posterior extending downwards to fourth rib, bronchial breathing with large resonating rales over area corresponding to dullness.

X-ray findings showed numerous cavities throughout left upper lobe, whole lung being much darker than right, disseminated conglomerate tubercles in lower lobe.

Phrenico costal sinus obliterated.

Sputum, T. B. positive.

Diagnosis.—Chiefly unilateral fibrocaseous cavernous tuberculosis with cavity manifestations in the foreground.

A pneumothorax was attempted but was impossible to perform on account of adhesions.

Operation.—Phrenikotomie.

Indication.—Case I, abscess cavity, right lower lobe. Case II, unilateral fibrocaseous cavernous tuberculosis with cavity manifestations in the foreground. Left side.

Technique:

1. Dry iodine preparation to cervical region.

2. Subcutaneous infiltration of a 1 per cent. solution novocain made along posterior border of sterno-mastoid muscle.

3. Incision about 10 cm. in length along posterior border of sterno-mastoid, incision reaching to clavicle. After incision through superficial fascia and platysma a wide blunt dissection was made with Mayo dissecting scissors, care being taken to avoid external jugular vein and superficialis colli nerve and descending or supra-clavicular branches of cervical plexus, by retraction. Posterior border of clavicular portion of sterno-mastoid was retracted medianwards and posterior belly of omo hyoid and scalenus anticus was exposed. After incising prevertebral fascia phrenic nerve was brought in view lying on anterior surface of scalenus anticus. On catching up phrenic with blunt hook, patient experienced a dull indefinite pain in lower thoracic region of right side. When the nerve was cut this sensation was exaggerated, patient describing it a dull painful "thud." During the dissection patient complained of slight pain, only twice, due to manipulation of phrenic and superficial descending branches from cervical plexus.

END RESULTS

Case 1.—Immediately after, under the fluoroscopic screen, the diaphragm was noted to be in state of extreme expiration position with almost no mobility. The cavity was distinctly flattened. No opportunity has been had to re-examine the patient, but during the past year she reports a much lessened amount of expectoration and an improvement in her general condition.

Case 2.—Fluoroscopic screen and plate showed diaphragm as in previous case, high standing and immobile. Patient reports during the past year a marked improvement in general condition, and a markedly diminished cough

and expectoration, until one month ago when she began to decline in weight and experienced an increase in cough and expectoration, which she attributed to overwork.

Re-examination one week ago, screen shows *mobility* of diaphragm equal to opposite side-diaphragm movement not of the paradox type. *X*-ray plate shows diaphragm standing at same level as opposite side.

CONCLUSIONS

From our limited experience, phrenikotomie alone, is of little value, and is to be considered purely as an adjunct to more extensive thorocaplastic procedures. The Zurich clinic report apparent permanent paralysis of the diaphragm, in one of our cases it was not.

EXUDATES IN ARTIFICIAL PNEUMOTHORAX

By LeRoy S. Peters, M.D.

Albuquerque, N. M.

The treatment of tuberculosis by the injection of nitrogen or air into the pleural spaces has now been given sufficient trial and the glamour incident to a rather novel, as well as a striking method of treatment, having faded we are able to examine sanely the results and to tabulate into rather accurate form the good and evil incident thereto. I believe there is little doubt in the minds of most tuberculosis workers that we have in artificial pneumothorax a sane procedure, if due thought and consideration is given the selection of cases. In that we are all agreed. On the other hand that too many have operated without this due thought and consideration, and in many cases with disastrous results, admits of no argument.

However, it is not within the province of this paper to deal with phases of the question other than from the standpoint of exudates. Herein lies a complication that deserves more than passing notice, for in an experience covering over 3 years in this method of treatment no one complication has given the trouble and worry, both to physician and patient, as has the occurrence of effusion.

At the end of the first year of our work I was inclined to feel that the question of effusions was somewhat of a myth, and I even flattered myself that our technique was faultless and our knowledge of this form of operative interference was of necessity perfect. Otherwise why should we, as against so many others fail to elicit fluid in the chests of our patients. Just, however, as I was riding on the crest of this wave of satisfaction our first case developed and to be brief many others followed until over 60 per cent. of cases treated a year or more showed varying amounts of fluid. From close observation I now feel confident in predicting that given the proper amount of time practically 90 to 100 per cent. of cases operated will show these varying amounts of fluid. To cite an example, one patient had received gas for 19 months with perfect results when suddenly a moderate effusion occurred which went from serous to sero-purulent and finally became purulent, showing however on culture and by microscopic examination the presence only of the tubercle bacillus.

The question as to cause of exudates is a difficult one. Various opinions have been expressed and there may be reason in all. However, it may be very confidently stated that owing to the uniformity of their occurrence the causative factors must lie within the chest and not without, in other words the factor of infection in refilling is very improbable. The fact that when a pneumothorax has been established thus separating the pleural surfaces, an extension of the tuberculous deposits on this surface is easier inasmuch as

there is no opportunity to retard the spread of tubercle by a gluing together of the surfaces as is seen in the average pleura (von Muralt).

Then too we have the pleura in an unphysiological position, which as Kaufmann has demonstrated in dogs produces an anatomic change in the serosa, as is evidenced by the decreased ability of gas resorption. One has a right to expect that the infected pleura is particularly disposed to exudative inflammation under these changed relations. Forlanini observes that exudates occur after exposure to cold or from exertion and mentions the fact that the transitional seasons, especially March and April show the greatest number of such cases. In our experience we are able to bear this out to a certain extent, our greatest number developing in the change from our excellent fall climate to our winter.

In my opinion there is also an irritative effect of the gas pressure on the layers of the pleura even though a minimum pressure is produced. The very fact of a foreign element within the pleural cavity must of necessity cause inflammation with its attendant exudation. I see little, if any difference, in the effect upon the pleura of the different methods of operation, although I believe all Americans, at least, used the Forlanini procedure. This fact alone when one considers the percentage of effusions abroad where for a long time at least the Brauer open method was used speaks little for the technique as a causative factor.

Exudates may be classified as serous, sero-purulent and purulent, the latter being divided into those showing no organism except the tubercle bacillus and those showing a mixed infection, usually the staphylococcus, the latter being relatively rare, both in the work here and abroad. In my classification I have grouped the sero-purulent and purulent exudates under one head. It may be well to state at this time that in all our pus cases the specific gravity was high and a large albumen content was demonstrable, showing without question the fluid to be an exudate rather than a transudate. It would seem that there should be little question at least as to this distinction unless a hydrops could be demonstrated elsewhere in the body.

In all of our series of pus cases, as I will show later we were able to demonstrate by cultural methods and microscopic examination tubercle bacilli alone in all but 3 and 2 of these showed a staphylococcus, the other leaving before a specimen could be obtained. However, owing to the symptoms we supposed the case to be one of mixed infection. Another patient developed high fever, but we could not demonstrate the presence of fluid after repeated examination. Later he left for Colorado and his physician reported that a few days after arrival the presence of a pleural effusion was noticed. The journey no doubt was responsible for the formation of the fluid since I feel reasonably sure that had it been there in an appreciable amount we should have detected its presence.

The effect of effusions is open to discussion. Certain writers (von Muralt, Koniger), believe that they have demonstrated the presence of antibodies in the exudate and also in the blood stream, and attribute the beneficial effects noticed to this bio-chemical reaction. However, I fail to see why we should look further than the mechanical effects which in my opinion seem to

explain everything. It is a conceded fact that in very unfavorable cases of tuberculosis anti-bodies can be demonstrated in the blood but these same patients die of their disease, while in many favorable cases the presence of such bodies cannot be demonstrated and yet these same patients recover. Taking now the fundamental idea in the production of a pneumothorax we agree that it is the absolute rest of the lung by the application, so to speak, of a gas splint, to all intents and purposes the same as a plaster cast on a tuberculous knee, that produces our results. Why then, when we substitute fluid for gas should there be any difference in the outcome? As a matter of fact the presence of fluid slowly absorbed lengthens the intervals between the filling, which in itself is to be desired. However, we must admit that the complication is undesirable, highly disagreeable, even dangerous and the slight advantages gained do not counter-balance the disadvantages.

Many authors mention the diminished absorption of nitrogen and a stiffening of the mediastinum, which of course would allow of the possibility of higher pressure without danger of a pushed over mediastinum and a disagreeable downward pressure on the abdomen. These high pressures even under such conditions are however to be discouraged.

Added to this we have noticed in a few cases after absorption of the fluid a shrinkage of the affected side which is no doubt due to pleural thickening and the formation of adhesions together with a certain amount of fibrous deposits from the exudate. The one possible advantage to be gained from this I believe is the ultimate tying down of the diseased lung for life; in other words we have established a continuous compression even after the absorption of the gas.

Now relative to the treatment of these conditions. In the common serous exudate I believe interference is contraindicated as long as the effusion is producing no pressure effects or is showing no tendency to absorb and thus glue the pleural surfaces together, when if pneumothorax is to be continued sufficient gas should be given to insure separation of the surfaces. The danger of repeated tapping lies in the chance of possible infection. Here we have an excellent culture media and a single virulent organism carried in on the needle would be sufficient to produce an army of workers in a short space of time.

In the purulent effusions showing only tubercle bacilli it is our custom to aspirate as fast as sufficient amount is formed to cause pressure symptoms, or regardless of the amount if high fever exists and if there is a tendency toward a thick pus we introduce a 2 per cent. formalin and glycerine solution. The number of aspirations varies in the different patients so no hard and fast rule can be made, some forming very rapidly and others very slowly.

In the mixed infection cases we have tried aspiration with the introduction of formalin and glycerine solution and pursued a policy of watchful waiting only to find that ultimately it becomes necessary to put in drainage and to leave a discharging sinus. In the majority of all exudates the positive pressure causes more annoyance than the same pressure before exudation takes place. Usually, however, this symptom as well as the fever incident thereto can be controlled by keeping the pressure about neutral or slightly negative.

The entire treatment can be summed up in the one word conservatism, with the exception of the mixed infection where radical surgical interference is indicated.

The ultimate outcome of all fluid cases, except mixed infection, I consider good even though showing a purulent exudate containing only the tubercle bacillus. Of course the length of time and behavior of patients differs. I have seen large exudates give absolutely no symptom and small ones cause great annoyance. I have seen pus develop to such an extent that the pleural cavity was half filled with a dirty green fluid and the patient exhibit no fever or untoward symptoms of any kind. Then I have seen small amounts of pus call for frequent aspirations to relieve high pressure symptoms and high fever. A certain percentage of patients after two or three aspirations develop no more fluid and have an uninterrupted recovery, while a few have been repeatedly aspirated for months with no apparent change in their condition. Some of our pus cases have recovered perfectly, others although still under treatment are giving no cause for apprehension, while the mixed infection cases have been drained leaving a discharging sinus. One of these is running a normal temperature and going to meals having gained her former weight and looking perfectly well, while the other is still confined to bed after 4 months with what I consider a grave prognosis. In all the cases we have had no fatality. I believe it is the consensus of opinion that many of these patients may be subject to exudates for various periods up to 3 years, and yet when the temperature returns to normal they can enjoy a fair degree of health with the prospect of ultimate recovery.

Serious as this complication may be viewed from an unprejudiced standpoint we should not be deterred from the use of artificial pneumothorax where it seems to be indicated. On the other hand conservative men, and I like to consider myself such, will hesitate to induce a pneumothorax until they have given a patient a fair trial on the usual Sanatorium routine. To use the procedure in early cases I believe to be a grave error, unless such patient shows a progressive tendency. On the other hand the percentage of pus cases showing the tubercle bacilli is so small, and the percentage showing mixed infection pus so much smaller, that we can consider the complication a negligible quantity where artificial pneumothorax is indicated.

I will now outline briefly in the following table the results of the work of Dr. A. G. Shortle and myself at the Albuquerque Sanatorium covering a period from May, 1912 to May, 1915.

Total number of patients operated, 110.

Total number of fluids, 32.

Percentage of fluids, 29.09.

Total number of fluids becoming pus, 12.

Total number of pus cases showing tubercle bacilli, 8.

Total number of pus cases showing mixed infection, 4.

Percentage of pus cases, 10.9.

Percentage of pus showing tubercle alone, 7.27.

Percentage of pus showing mixed infection, 3.63.

Now taking out the one patient that left for Colorado Springs, mentioned above, and the patient who returned home before a culture could be obtained,

we have but two, or a known percentage of 1.81 mixed infection exudates in our series, one of these being the result of a spontaneous pneumothorax from which of course the mixed infection was produced.

To be perfectly fair, also with respect to serous exudates, I can say that six of these patients showed an effusion before an attempt was made to produce an artificial pneumothorax. That reduced the total number occurring after the production to 26 or a percentage of 23.63. However, if we take those patients who have been under treatment for a year or more the percentage will run over 65, thus bearing out the report of other observers who have been working for some time that the longer we have these patients under observation the more effusions we encounter.

In a careful search of foreign literature I find in a series of 700 cases purulent exudates in 56 or 8 per cent. Out of this number two showed mixed infection, or 0.28 per cent., leaving 54 with pus showing tubercle bacilli alone, or a percentage of 7.71.

In an endeavor to obtain an average of results of men working in America I wrote certain physicians whom I knew to be following this line of treatment. I received replies from nearly all, but in the majority of instances they were very indefinite. Some had kept no accurate record of patients treated while a few saw the patients only for one or two fillings, then turning them over to the home physician for further treatment. However, as far as possible I will tabulate the results of this inquiry.

	Number	*Fluids*	*Pus*	*Mixed*
G. B. Webb	103	13	4	0
Ethan A. Gray	136	18	2	0
Moses Collins	16	1	0	0
Silvio von Ruck	65	12	2	1
Earl H. Bruns	28	11	1	0
Herbert King	57	6	0	0
H. Schwatt	70	12	3	0
Ralph Matson	32	6	2	0
C. L. Minor	51	10	2	2
	557	89 or 16%	16 or 3%	3 or 0.54%

Walter Holden and Mary Lapham give only the percentage of cases showing effusions. These are respectively 11.5 and 20 per cent. Holden cites one mixed infection due to spontaneous pneumothorax while Lapham mentions empyemas as a complication in her series. It is interesting to note that Lapham's percentage is about the same as ours and she has been using the method for 5 years. Our experience covers a period of over 3 years while the majority of American reports are for much shorter periods, and this, I am convinced, accounts for the lesser number of effusions. Gray states that he believes all cases show some fluid but reports only those in whom it can be easily demonstrated. I know from experience that the *x*-ray will show small effusions that would be overlooked in ordinary physical examination.

J. Woods Price states that in their series of over 100 cases they have had about 50 per cent. effusions, some becoming purulent but none showing mixed infection. From my own experience and from having closely followed the

literature I believe that the infections with pus organisms and with the tubercle bacillus must be looked for from within. That technique plays an important rôle can be no question, but when one adheres closely to the technique for major operations it seems hardly probable that the fault could lie there. On the other hand, if this were so, the effusions should, in the natural course of events, all become purulent, while we know that we encounter mixed infection only in a very small percentage of cases.

Bonny reports three instances of pyo-pneumothorax resulting from a spontaneous rupture and states that he is convinced that the infection comes from within. This is also the opinion of Floyd of the Massachusetts General Hospital of Boston and Bruns of the U. S. Army Sanatorium at Fort Bayard, N. M. Bruns further states that he believes that the infection is purely accidental and likely to happen to any operator, no matter how careful his technique. Webb believes that the infection can be from without or within, which of course must be granted until we have stronger proof than at present. Murphy and Kreuscher claim to have had no pleural effusions and state that if they should occur they would be due to causes other than the pneumothorax treatment. This coming from a man who was one of the first to use this method sounds amazing, especially in view of the experience of the vast horde of workers in this special field of tuberculosis endeavor. I am at a loss to account for his phenomenal results and shall await an opportunity to learn how such a disagreeable complication is to be avoided.

Holden is convinced that the technique plays a very important rôle and is sure we would have fewer pus cases if we watched the administration of gas more closely, his criticism being, that we are too prone to run high pressures. To offset this argument I can say that it is a rare occasion in which we ever bring the pressure to more than neutral and yet we have had the average percentage of effusion cases.

Gray believes that nitrogen is sufficient cause for the effusions and deplores the frequent aspirations of such fluids, never interfering unless to relieve an embarrassed heart or opposite lung. He mentions the use of a blunt needle for the first operation on the infected lung. There can be no doubt that this point is wisely taken for one can easily see the grave possibility of infection after such puncture. Shortle believes in frequent aspiration of fluids and the refilling with gas in order to avoid a possible rapid absorption and glueing together of the pleural surfaces, thus prohibiting the further continuance of a pneumothorax. I believe there is a happy medium to follow and would advise that a careful watch be kept only interfering when there seems to be absorption of the fluid taking place.

From the foregoing statements and tables it seems to be demonstrated first, that given sufficient time fluids develop in the majority of patients.

Second, that a certain percentage of these fluids become purulent.

Third, that the majority of these purulent effusions are due only to the tubercle bacillus.

Fourth, that a certain small percentage show organisms other than the tubercle bacillus constituting an empyema.

Fifth, that unless producing pressure symptoms and high fever serous effusions and effusions showing tubercle bacilli should be left alone. Aspirate as little as possible.

Sixth, that all mixed infection exudates should receive proper drainage and be treated by radical surgery.

Seventh, that the slight advantages accruing from exudates are offset by the many disadvantages.

Eighth, that as the percentage of purulent exudates is so small we can consider the complication a negligible factor where artificial pneumothorax is indicated.

A CASE OF SPONTANEOUS PYOPNEUMOTHORAX COMPLICATED BY HYDRO OR PYOPNEUMOPERICARDIUM

By Alfred Meyer, M.D.

New York

Cases of pneumopericardium and its allied diseases of hydropneumopericardium and pyopneumopericardium are so rare that the vast majority of medical men have never seen one.

In 1904 W. B. James published a case of his own and could collect from the literature a series of only 38 other cases. In his very excellent article he quotes Schroetter as saying, "The infrequency of the presence of air or gas in the pericardiac space may be gathered from the fact that I never had an opportunity of observing such a case in thirty-five years diligent study of the enormous clinical material offered by the City Hospital (Vienna), while our predecessor and teacher, Skoda, had the same experience."

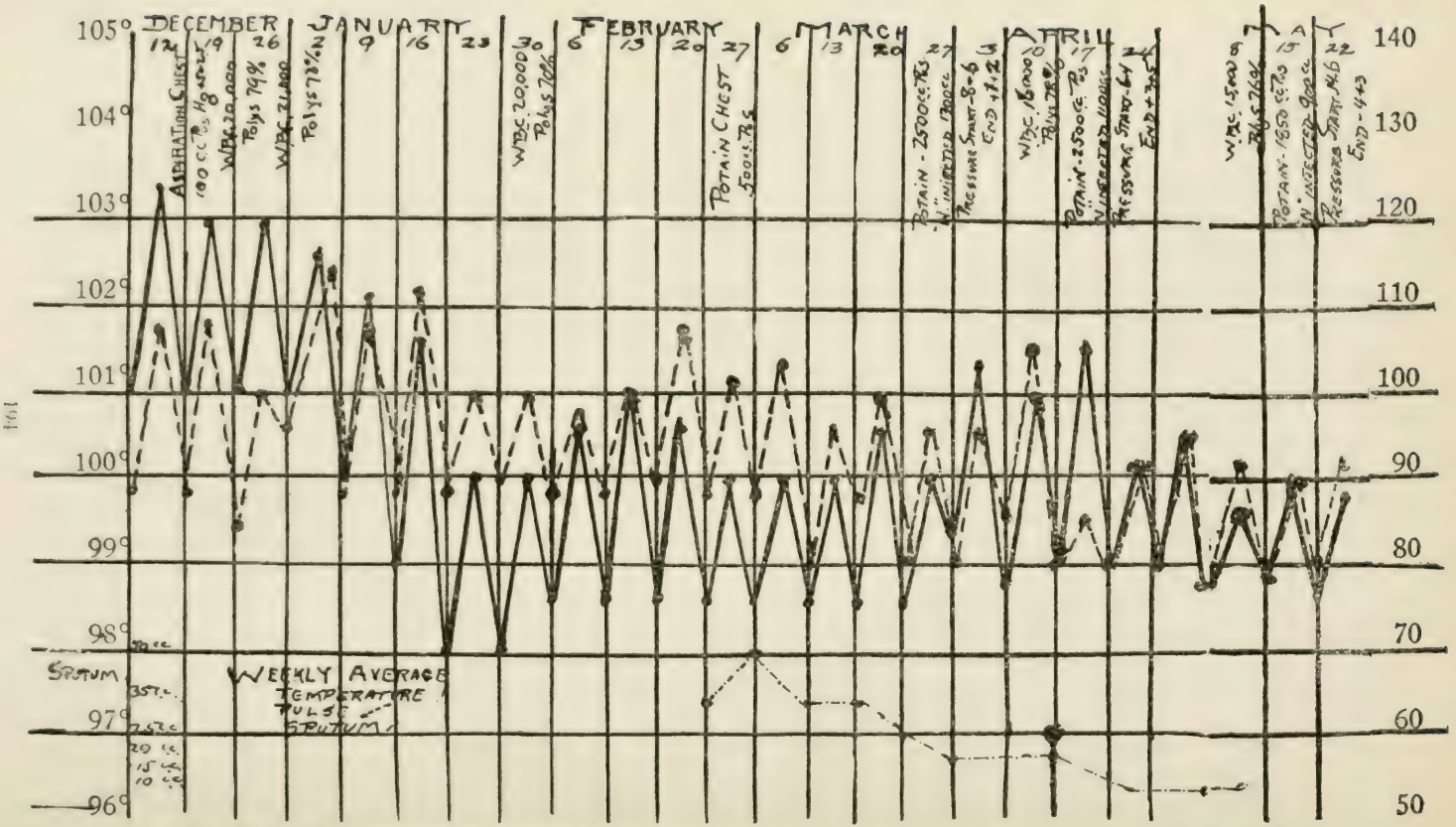
I, however, have been able to add 10 more cases* to James' list, published before his article appeared, which were no doubt accidentally omitted, and the four following cases were published since the appearance of his article: that of John Cowan in 1912; Wenckebach, in *Zeitschr. f. Klin. Med.*, Berlin, 1910, lxxi, 402; Ljungdahl, in *Deutches Arch. f. Klin. Med.*, Leipz., 1913, cxi, 19–20 and J. Burke, *Buff. Med. Jr.*, 1908, lxiv, 531.

bination. The nearest approach to the case observed by me is the one pub-

The interest of Cowan's case and that of Wenckebach, which was one of *artificial* pneumopericardium is much enhanced because of the fluoroscopic and skiagraphic findings, of which latter characteristic plates are reproduced. So far as I could find, they are the only radiographs of pneumopericardium extant besides my own.

The object of the present paper is to publish the records of a case in which a a hydro (pyo?) pneumopericardium was present together wth a pyopneumothorax, a combination apparently so rare that a diligent search of the literature made for me at the library of the New York Academy of Medicine has failed to find a similar one. It is true, Baeumler says, with reference to prognosis in pneumopericardium, that the rupture of a pneumothorax or even a pulmonary cavity into the pericardium can heal spontaneously, but he gives no cases or references, or other indication that he has seen such a com-

*List of cases not mentioned by James: Lundie, Edin. Med. jr., 1891-2, xxxvii, 220; Clasen, F., 8°. Giessen, 1895; Beckers, J., 8°. Gryphiae, 1860; Timmers, C. S., 8°. Leiden, 1879; Conn, G. P., Tr. N. Hampshire Med. Soc. Concord, 1871, 84; Hawkins, C., Lancet, Lond., 1860, ii, 411; Joy, W. B., In Syst. Pract. M. (Tweedie) 8°. Lond. 1840, iii, 378; Niemeyer, Deutsche Klinik. Berl. 1860, xii, 359; Soraner, Constatt's Jahresber, 1858, i, 215; Love, Lancet, 1888, i, 319.



PYOPNEUMOPERICARDIUM COMPLICATING PYOPNEUMOTHORAX IN A CASE OF BILATERAL PULMONARY TUBERCULOSIS.

lished by Lundie; this was a case of spontaneous left pneumothorax in a young man of 20 years with recovery in about 3 weeks *and then followed* by a hydropneumopericardium from which he also recovered; in other words the two conditions were not present at the same time.

My own case is that of a male, B. B., peddler, 29 years old, who was admitted to my service at Mt. Sinai Hospital on December 12, 1914. He claimed to have had a cough for a period of 6 months, with dull pain in left chest, becoming acute, sharp and constant *two days before* admission; expectoration for 3 months and night sweats for only a few days; his weight had dropped to 120 pounds from 175 pounds in 6 months.

My first examination was made two days after his admission. His rectal temperature was ranging between 100° and 104°, pulse from 96 to 132 and respiration from 28 to 36; tubercle bacilli had already been found in his sputum several times. There was dullness at the right apex to the third rib with much crepitation; on the left half of the chest, both anteriorly and posteriorly, the ordinary signs of pneumothorax were present (tympany, absent respiratory murmur and voice, and decreased motility) *but no succussion.* The heart borders could not be mapped out and its sounds were best heard to the right of the sternum; but the most interesting and unexpected physical finding was *a peculiar amphoric or metallic tinkling or splash,* sometimes with systole and sometimes with diastole.

In a rather extensive experience with both spontaneous and artificial pneumothorax, I had never heard a similar physical sign, and I strongly suspected the existence of both fluid and air in the pericardial sac to account for this remarkable phenomenon. *It must be noted that at this time there was not yet proof of pus in the pleural cavity, nor was any succussion sound to be elicited by the usual manoeuvre.*

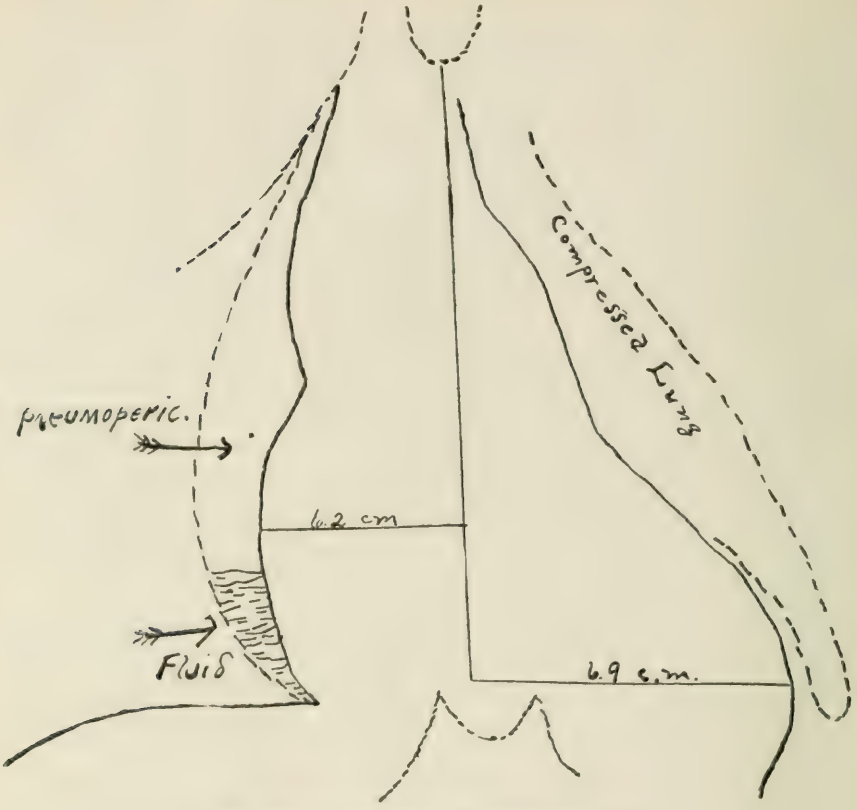
A skiagraph of the chest taken on December 15 showed a nearly complete pneumothorax of the left side, the left lung collapsed and its edge forming a perpendicular line in the parasternal line. *A linear shadow was seen along the right border of the heart and parallel with it. Its exact significance was undetermined.*

On December 17, the peculiar splash above mentioned was audible in the precordial region and just below the angle of the left scapula. On this date a fluoroscopic report of the chest says:

"A linear shadow to the right of the heart runs parallel with its right border. A study of the relation of this shadow to the heart indicates that it probably represents the pericardium. There is evidently here a pneumopericardium which occupies the right and anterior portion of the pericardial cavity, displacing the heart backward. There also appears to be a small effusion at the base of the pericardium on the right side."

Orthodiagram on December 19 showed the following:

"The heart is displaced somewhat to the right together with the mediastinum. On the right side the pericardial cavity is seen to contain air. At its base is seen a fluid level agitated by each beat. A lateral examination shows



ORTHODIAGRAM TAKEN DECEMBER 19, 1914

the pericardial cavity anterior to the heart full of air crowding the heart back. The collapsed left lung is seen lying close to the left border of the heart, a small layer of gas, possibly in the pericardium, intervening."

Physical signs of effusion in the left pleural cavity appeared on December 21, with dullness in the sixth left interspace when seated; one inch below this when lying down. Succussion was also elicited. The heart borders could not be mapped out very distinctly and the heart sounds had a musical character. Tympany extended to the right of the midsternal line a distance of

1 cm. at the level of the 2d rib
3 cm. at the level of the 3d rib
6.5 cm. at the level of the 4th rib
8 cm. at the level of the 5th rib

Fluoroscopic report on the 23 showed "a left pneumothorax with unquestionable evidence of fluid in the left chest, the latter showing tumultuous waves due in all probability both to respiratory and cardiac influence. The right border of the pericardium seems to be more to the right than at the

FIG. 1. DORSO-VENTRAL UPRIGHT
Pericardium separated from heart ½ inch. Pneumothorax; tuberculosis right lung
p, pericardium; *l*, compressed lung; *pn*, pneumothorax

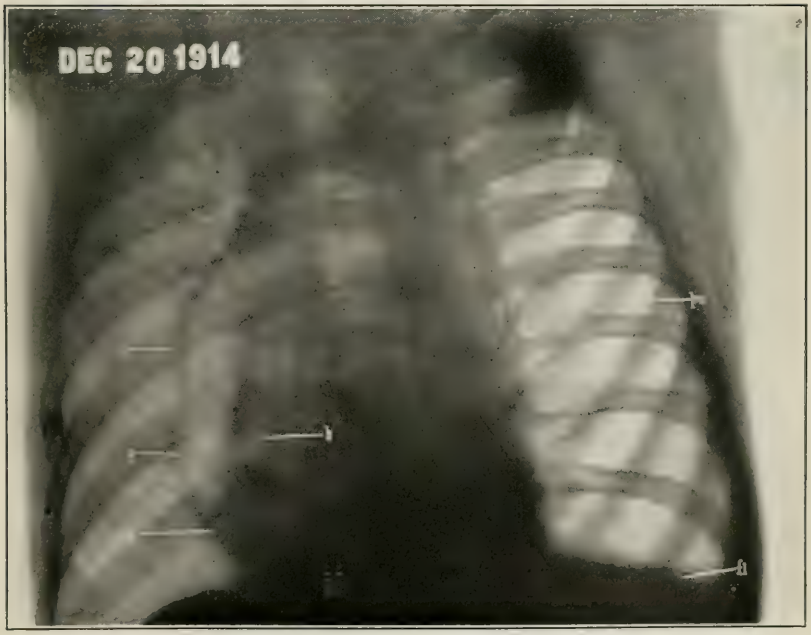


FIG. 2. SLIGHTLY OBLIQUE
Shows pneumopericardium and beginning effusion into pericardium; pneumothorax left side
p, pericardium; *h*, heart; *pn*, pneumothorax; *fl*, fluid in chest

FIG. 3. OBLIQUE
Shows pneumopericardium with fluid at base of pericardial cavity
p, pericardium; *pf*, fluid in pericardium

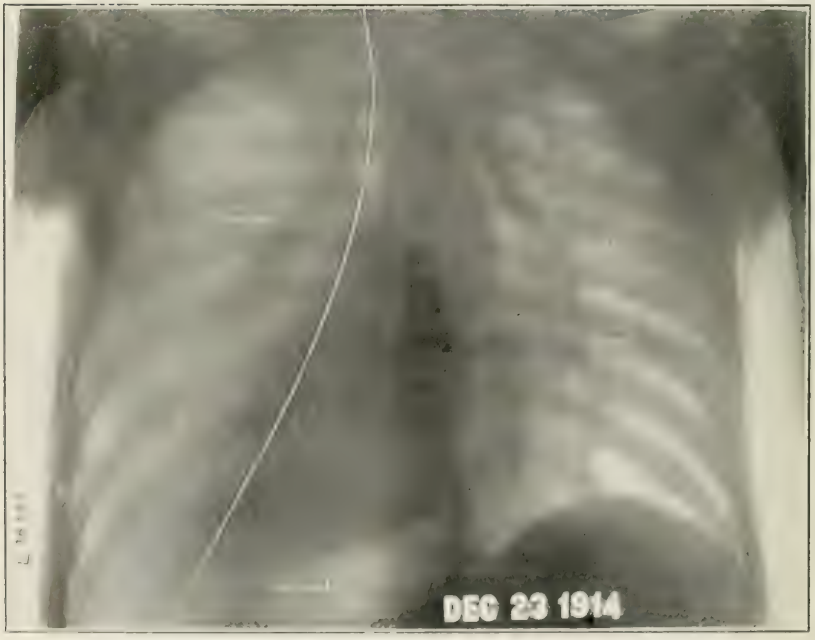


FIG. 4. RECUMBENT VENTRO-DORSAL
Shows [illegible] with compressed lung; left diaphragm depressed; complete outline of lower border of heart; pneumopericardium 1¼ inches wide
p, pericardium; *pn*, air and fluid in left chest; *l*, compressed lung; *h*, lower border of heart

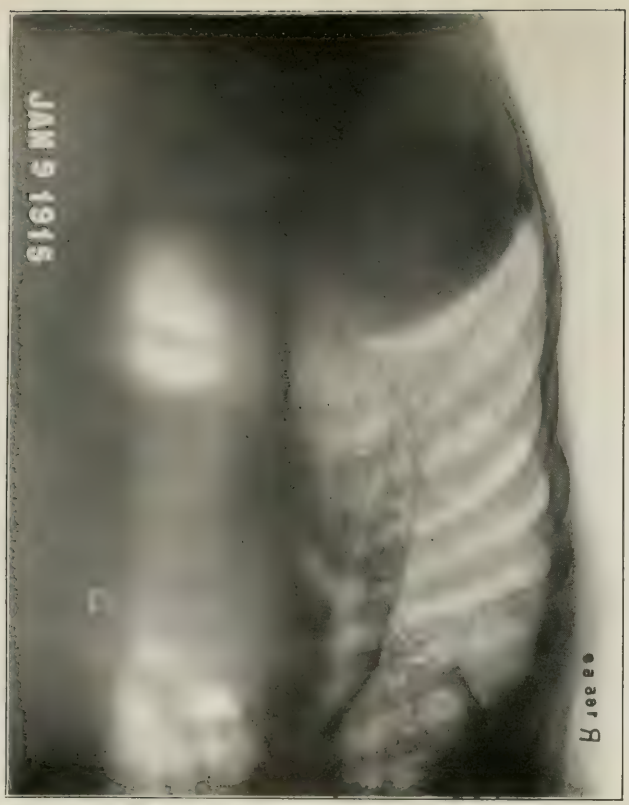


FIG. 5. PATIENT LYING ON LEFT SIDE

Pyo-pneumothorax showing fluid level; plain pneumopericardium. *f*, pericardium

FIG. 6. OBLIQUE

Shows much thickened pericardium with air above and fluid below. Pneumothorax *p*, pericardium; *fl*, fluid in pericardium; *pn*, pneumothorax

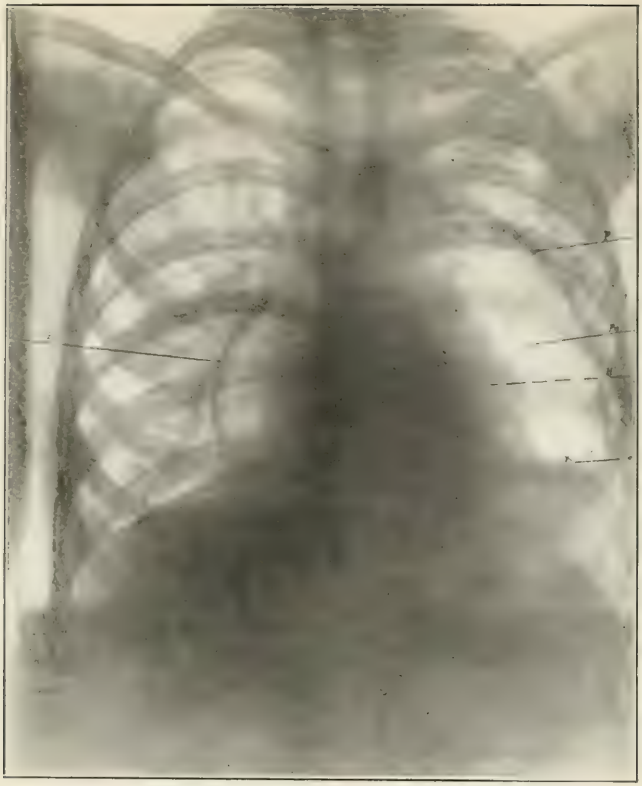


FIG. 7. WENCKEBACH'S CASE OF ARTIFICIAL PNEUMO-PERICARDIUM
P, Thickened Pericardium; *H*, Heart; *Pn*, Air in Pericardium; *F*, Level of Fluid

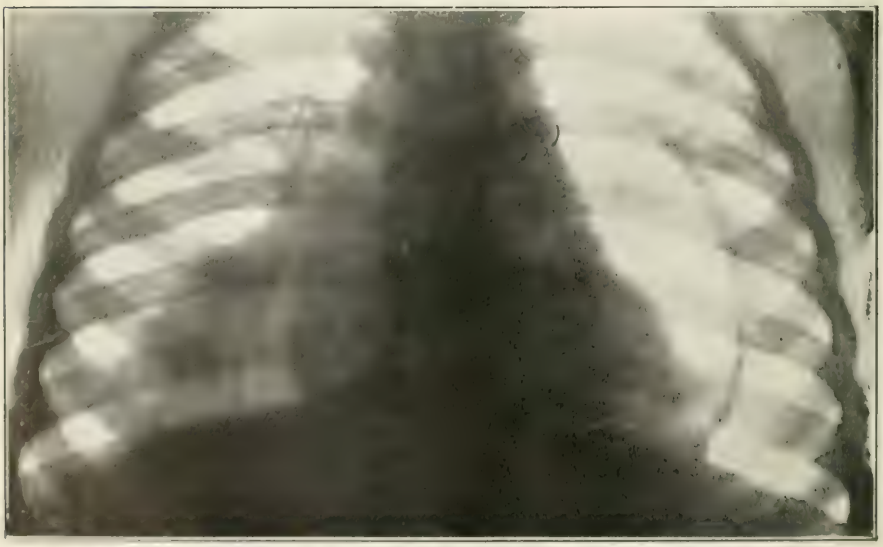


FIG. 8
December 6, 1913. The Heart has regained its normal situation. The distention of the pericardial sac is lessening.
Case of Cowan et al. Quart. Journ. of Med. 1913-1914

first examination. An interval between the heart and the pericardium seems to be greater, as if the pneumopericardium had either increased or had become more apparent. A small amount of fluid in the pericardial cavity reaches about one inch above the inferior surface. *The fluid in the pericardium can be seen undulating apparently with the cardiac impulse." The report should also have stated that the level of the fluid in the pericardium was above the level of the fluid in the pleural cavity.*

On December 24th about 100 c.c. of air were withdrawn and intrapleural tension taken at the same time and shown to be 5 mm. of mercury (equivalent to 65 + mm. of water), a mercurial manometer having been used in place of the usual water manometer attached to the Floyd Robinson apparatus, because of the expectation of finding a pleural tension too high for the water manometer.

On January 8 an electrocardiogram taken by Dr. B. S. Oppenheimer showed absence of P wave and a constant irregularity, but not the typical oscillations of auricular fibrillation. The electrocardiograms were interpreted as indicating auricular fibrillation in all probability. The R wave in lead III showed considerable variation.

On January 9 10 c.c. of cloudy, yellowish, thin fluid were aspirated from the left chest and proved sterile, both aerobically and anaerobically.

On January 18 *cardiac splash could be heard with the naked ear at a distance of 18½ inches from the chest wall near the apex.* On the same date there was also audible a to and fro sound like pericardial friction, plainest near the sternum with the patient semirecumbent.

On January 26 electrocardiograms showed a decided change in the heart's action since January 9: "The heart's action is regular now, the auricular wave (P) is present in every cardiac cycle. Variations in wave R have disappeared and there is now not the slightest evidence of any fibrillation of the auricles. Wave T is inverted in leads II and III."

The continued rise of fluid in the left pleural cavity gradually obscured the splash more and more and on January 28, with the fluid level in the third space in the upright position, it could only be heard when the patient was absolutely flat on his back and up to a distance of 6 inches from the chest wall with the naked ear. On this same date both liver and spleen were palpable below the free border of the ribs, due in all probability to both enlargement and to compensatory emphysema of the right side and depression of the diaphragm on the left.

A skiagraphic plate of March 2 still showed the presence of a small sized pneumopericardium.

On March 5 500 c.c. of greenish yellow pus were removed from the left chest, but on March 23 the physical signs indicated that the patient's left pleural cavity was again full of pus to the top.

On March 8 an electrocardiograph showed very small waves in all three leads, indicating poor heart action.

On March 29, at a second aspiration, 2500 c.c. of purulent fluid were removed and 1300 c.c. of nitrogen substituted. Similar aspirations and substitutive nitrogen injections were made on April 19 when 2500 c.c. of

thick pus were removed and 1100 c.c. of nitrogen injected and on May 20th at the fourth and last aspiration 1850 c.c. of pus were withdrawn and 900 c.c. of nitrogen substituted. All three times, previous to aspiration, the intrapleural tension was negative.*

Long before the last aspiration and nitrogen substitution, the patient had been up and about, insisting that he felt well enough, resisting all persuasion to remain in bed and even threatening to leave the hospital if his liberty were denied him.

Temperatures, which during the first month ranged between 100° and 104° reached the normal for a few days in the sixth week, and then fluctuated during the next few months mostly between 99° and 100.6°.

The original pulse range of 96 to 132 fell in March to 84 and during the month of May was continually in the 70's.

The original respiration range of 28 to 36 fell to 24 in March.

The daily sputum total which originally varied between 25 and 45 c.c. dropped gradually to between 12 and 20 c.c. per day. The leucocyte count never went over 21,000 and was still 15,000 on May 15 with 76 per cent. polys. and 24 per cent. lymphocytes.

The patient's weight on admission was 120½ pounds; it reached 128 pounds in February and was still 124 pounds on May 20 when this history was written.

The urine occasionally contained small amounts of albumen.

In spite of the comparatively favorable progress of this remarkable case, there can be no doubt of the presence of fluid and air in both the pleural and pericardial sacs. All the evidence points that way: physical signs, fluoroscopic and radiographic findings. That the fluid in the chest was pus was of course proven by the aspirations; that the fluid seen and heard in the pericardium was pus is only presumption, no aspiration of that cavity having been undertaken. There is no evidence indicating whether the same tuberculous lesion in the lung which caused the pyopneumothorax also caused the pneumopericardium; or, if so, where this lesion was situated; or whether a point of lessened resistance in the pericardium gave way to the pressure of the pneumothorax, causing a communication between these two serous cavities. But of the value of the *x*-ray in confirming the coexistence of these two serious lesions there can be no question. For comparison, I am appending a skiagraph of Cowan's case of spontaneous pneumopericardium, and of Wenckebach's case of artificial pneumopericardium (aspiration of tuberculous pericarditis and injection of air). The close resemblance of these two pictures to my own pneumopericardium is most striking.

Finally, I wish to draw attention to the conservative treatment of this case under circumstances where the temptation would have been irresistible

*At an examination on May 20th, 1915, after complete aspiration of the chest and nitrogen substitution there was no succussion obtainable but the systolic splash was audible. Patient was immediately fluoroscoped. The chest was seen to be empty (clear diaphragm and costophrenic sinus). In the lateral position, seated, the thickened pericardial sac was seen to be filled with air and containing some fluid at the base that oscillated with cough and cardiac impulse. No fluid was seen in the chest.

for some to have had a pericardotomy and perhaps a thorocatomy with rib resection performed.

Merely for completeness sake I wish to refer to a statement made by James in his article on pneumothorax, in Osler's *Modern Medicine;* namely, that "the heart sounds occasionally have the same metallic quality as that of amphoric breathing, deriving this from the adjacent cavity." I must frankly admit that I have never been able to confirm this finding, though in an attempt to elicit this sign or cardiac splash, I recently auscultated 4 cases of hydropneumothorax in a great variety of position (including knee-chest, recumbent, prone, lateral and Trendelenburg) but unsuccessfully. I also sent to 36 physicians with large experience throughout the country, the following query:

"1. Have you ever seen either a spontaneous or artificial pneumopericardium?

"2. Have you ever heard a splash synchronous with cardiac systole in a case of hydro or pyo-pneumothorax?"

All my replies to the first question were negative. Three suspected having heard cardiac splash in undoubted hydropneumothorax with no proof offered that they may not have been cases complicated by hydropneumopericardium. The suspicion is justified that in some of these cases of cardiac splash fluoroscopy and radiography, as in my case, would have proven extremely valuable, and might have demonstrated the coexistence of a hydropneumopericardium.*

My acknowledgments are due to Drs. Jaches and Wessler of the X-ray department and Drs. Beck and Piller of the house staff for assistance in the preparation of this article.

DISCUSSION ON PAPERS BY DR. SACHS, DR. VROOMAN, DR. SCHWATT, DR. MATSON, DR. PETERS, AND DR. MEYER

Dr. Edward O. Otis, Boston: Hardly any new procedure in medicine or surgery has come into such prominence within the last few years as artificial pneumothorax. The literature upon the subject is now quite enormous—whole issues of medical periodicals have been devoted to it. It was one of the main topics for discussion in the last International Tuberculosis Congress at Rome. An International Artificial Pneumothorax Association has been formed which disseminates literature upon the subject. There is hardly a sanatorium or consumptive hospital in which the operation is not done. Experience and knowledge upon the subject has, therefore, accumulated rapidly, and we are in a position to form a fair estimate of its value from results.

* Patient left the Hospital on June 6th against advice and was readmitted for aspiration on June 15th, again on July 22nd, with a gain of ten pounds to his credit—and finally on August 27. He died on August 28th, 1915. Metallic tinkle over precordium in semi-recumbent position was still audible on July 22nd.

A skiagram taken July 26th showed left pyopneumothorax. The heart was entirely in left half of chest (retraction)? and no pneumopericardium was demonstrable.

In spite of persistent effort no postmortem was obtainable.

After Forlanini, the pioneer and ardent advocate of this treatment, we are perhaps more indebted to Brauer of Hamburg than to any other single investigator of this form of treatment, for bringing the subject definitely before the medical public which is occupied in the management of pulmonary tuberculosis. There is a wealth of clinical experience in the marvelously minute and painstaking histories of the 100 cases which he published in 1911, cases extending over a period of 5 years. We hear much of German efficiency and their attention to details in these days. Surely Brauer's work is an admirable illustration of this Teutonic characteristic, and no one who desires to become familiar with the subject can afford to neglect his work, although his method of operation has now fallen into disuse.

From the extensive evidence at hand from all over the world, no one can deny the value of artificial pneumothorax in pulmonary tuberculosis when other means fail. In some cases it brings about an arrest of the disease not otherwise attainable; in other cases, a relief from one or more of the distressing symptoms. Its applicability is limited, in my opinion, and it is often unsuccessful. As Balboni well says, "it is an unusual therapeutic measure, the creation of a pathological condition in order to cure or relieve another pathological condition," and is "only to be undertaken after careful consideration of each individual case."

In general, there is a unanimity of opinion among those of the most experience as to the indications for applying this treatment: extensive unilateral (or chiefly so) progressive or chronic lesions which fail to respond to the ordinary hygienic-dietetic treatment, or to tuberculin. Second: recurring more or less severe hemoptysis which fails to yield to the ordinary treatment, or very severe hemorrhage not otherwise controlled, provided, of course, one can be sure from which lung the hemorrhage comes.

All of Brauer's cases, as he says, were those in which the condition and progress of the disease gave an absolutely unfavorable prognosis. "If you are to judge of the results of the treatment with artificial pneumothorax," says Saugman, "it must at once be understood that this treatment deals with very severely attacked, third stage patients of whom a great part, indeed, most of them, without this treatment would have practically no chances of recovery or healing."

There seems to be some diversity of opinion and practice, however, in regard to the two extremes, the earlier cases and the last stage ones. Pneumothorax therapy is by some recommended for early or incipient cases which appear to have no recuperative power or show no improvement under the ordinary treatments; also in early cases which have no opportunity for the usual open-air treatment; or again, when the "progress toward improvement is particularly slow." At the other extreme, this treatment is employed by many in otherwise hopeless or doomed cases as a last desperate resort. Whenever compression can be consummated occasionally an arrest is obtained.

There seems to be no doubt that the unilateral cases with but little or no infiltration in the other lung, and that inactive, and where there is still a fair amount of resistance, offer the most favorable conditions for this treatment and give the best results. The percentage of such cases which are either arrested or greatly improved is placed as high as 40 or 50 per cent. (Floyd).

To assume that if the operation does no good it will do no harm is, I believe, false; for there is always the possibility of pleural shock, gas embolism, subcutaneous emphysema, infection of the pleural cavity, disturbance of the blood supply from displacement of the heart, a lighting up of the inactive process in the other lung, effusions, serous or purulent. It is an operation that should only be entered upon advisedly, discreetly and in the fear of those possible dangers. One must also bear in mind that although he may consider the operation a very simple one, to the patient it means an *operation*, with all the dread that the word suggests, and he will not infrequently elect to take his chance without it, when it is advised, rather than undergo the mental anguish which the fear of an operation produces. This fact again reduces the number of cases to which we can apply the pneumothorax treatment.

A word with regard to the *x*-ray. The consensus of opin ion is, I think, that one is not justified in carrying on the treatment without constant access to the *x*-ray with a skilled technician. Before beginning the inflation a careful study of the *x*-ray picture of the lungs should be made and subsequently, both before and after each inflation; only in this way, by ocular evidence, can we be sure that the case is a favorable one for the treatment and determine its success. Moreover, we can thus avoid many of the dangers incident to it.

As to the apparatus employed, there are almost as many kinds or modifications of one or another kind as there are operators. The main requisite is to use an instrument with which one is familiar, and which is as simple as the conditions will allow. Whatever the apparatus used, it should have a good manometer which can be easily read, and an arrangement whereby the flow of gas can be readily regulated as to pressure, and be steady. One of the most satisfactory forms of apparatus which has come under my observation is that of Professor Deneke of St. George's Hospital, Hamburg. In brief, it is made double. Upon one side of an upright standard is a complete arrangement for the injection of nitrogen gas, and on the other side is a replica of the same for the injection of oxygen gas, Professor Deneke's idea being that greater safety is insured if on the first injection oxygen is used, so that if by any chance the needle may have entered a vessel, the oxygen gas on account of its rapid absorbability will be much more likely to produce gas embolism. By simply turning a stop-cock, nitrogen gas can be substituted for the oxygen gas.

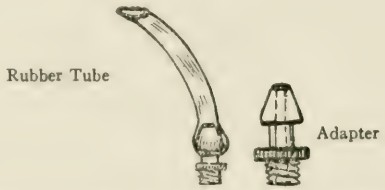
There have also been as many kinds of needles as apparatuses, each operator having his favorite one. Deneke's needle seems to me to have certain advantages, its peculiar characteristics being its extreme simplicity, consisting of a cannula and stylet, the cannula having a less acute angle at its perforating end than the ordinary needle, and is closed at this extremity, the opening being in the side just above the point.

There are many other problems in connection with artificial pneumothorax which could with great interest be discussed if time permitted; such, for example, as the amount of positive pressure permissible in case of adherent pleura, the amount of gas introduced at any one time and the frequency of introduction, the length of time the treatment should be continued, the effect upon the neighboring organs, the contraindications, and the employment of the treatment in recurring pleuritic effusions, bronchiectasis, and abscess.

The scope of artificial pneumothorax is apparently not yet fully determined, but that it has won a permanent place in the treatment of tuberculosis is assured. In the very conservative words of Saugman, "It has fully justified its place in the treatment of some severe cases of pulmonary tuberculosis and that, by it, recovery sometimes may be obtained when any other treatment would have failed." It is well to bear ever in mind, however, that it does not by any means take the place of the well known measures for increasing and maintaining the resistance, such as fresh air, rest and good and sufficient food, but like tuberculin it is an additional aid in certain cases and may save the day.

Dr. Alfred Meyer, New York: I should like to draw attention to what appears to me to be a simplification of the technique of artificial pneumothorax which I have used in a number of cases this winter.

In view of the fact that the preliminary step was always anesthetization of the pleura, it occurred to me that I might get immediate proof that I was between the two layers of the pleura by attaching my manometer tubing to the shank of the anesthetizing needle after unscrewing the barrel and before withdrawing it from the chest.



SIMPLIFICATION OF ARTIFICIAL PNEUMOTHORAX.

As a matter of fact, this proof was obtained in about a dozen cases in which the pneumothorax had already been created; in one instance I succeeded in making a primary pneumothorax by this method. Recently, I have found it more advisable to make the connection by means of an adapter obtained from Knauth Brothers, surgical instrument makers, New York City. One end of this adapter has a thread that fits into the needle and the other end is conical and permits an air-tight connection with the rubber tubing of the manometer.

By this method, if fluctuations are obtained, the injection of gas may be proceeded with and the patient is saved both the incision with the iridectomy knife and the additional stab with the large Floyd needle and a fresh hunt for fluctuations.

I have a very strong suspicion that I might have succeeded in some cases in which I failed if I had used a slightly longer and a slightly larger-caliber anesthetizing needle.

If in any individual case this method succeeds it will be found very much less tiring to keep the needle in position than by the use of the rather heavy and clumsy Floyd needle and without recourse to Dr. Baldwin's guard.

Permit me to pass around for your inspection this simple adapter and the needle that I am now using.

Dr. Vrooman spoke of a physician who had several hemoptyses. I think cases of hemoptysis occurring in a person apparently previously well, will have, everything else being equal, a better prognosis than the others. I would like to ask if anyone has had experience with Tuffier's method? As you all know, Tuffier insists that in most cases of apical tuberculosis, only the healthy parts of the lung are compressed by the usual method, leaving the affected part entirely uninfluenced. He has employed for many years the following procedure: He makes a resection of one or more apical ribs, separates the costal pleura for a considerable distance at the apex and fills in the extra-pleural space thus created with paraffin, or with adipose tissue from a freshly amputated breast, thus creating compression at the site of the lesion. In empyema the question of how much gas to put in is important. I put in about half as much gas as pus withdrawn. In the treatment of hemoptyses by the Forlanini method it is often impossible to determine on which side the lesion occurs and there is danger of collapsing the healthy lung. I believe this should act as a brake to those who rush in and use this method without due consideration. The operation is safe in the hands of those who realize the necessity of absolute conservatism.

Dr. Ethan A. Gray, Chicago: In regard to pleural shock, we ask, "What is pleural shock?" I must confess that I have never seen it in an experience of 1500 chest punctures. I am, therefore, skeptical as to its existence as an entity.

If we describe pleural shock as a gas "embolism," we shall come nearer the truth.

As to the amount of nitrogen which may be given—Dr. Vrooman's point—the quantity may vary with the size of the chest; as high as 1400 c.c. may be given. I have had no experience with a double pneumothorax. I have seen many serous effusions occur. Most of them disappear spontaneously, even massive collections of fluid. I am unwilling to tap these effusions unless there is a strong indication for such a proceeding, as, for instance, beginning embarrassment of circulation or respiration. The more one taps these fluid collections, the greater the danger of purulent change. The simpler the pneumothorax apparatus the better. I use a plain 18 gauge blunted asperating needle and the Murphy apparatus with water manometer. The preliminary incision with a cataract knife makes local anesthesia unnecessary. In fact, patients tell me that they prefer to take nothing.

Dr. George Mannheimer, New York: Dr. Gray is not clear about pleural shock. This as well as pleural eclampsia or pleural epilepsy are indefinite terms. We must distinguish between normal pleural reflexes and gas-embolism. I have seen spasm of the glottis produced by the introduction of cold gas into the pleural cavity. Another patient went into syncope when the pulmonary pleura which had been opened by an incision was tickled with a probe. These reflexes can be blocked by warming the gas by local anaesthesia and the preliminary administration of morphine. Gas-embolism cannot always be avoided. The symptoms depend on the point of lodgment of the emboli.

I am familiar with Wenchebach's case of pneumopericardium mentioned by Dr. Meyer. This was a man suffering from tuberculosis of the left upper lobe and a large pericardial effusion. There was vital indication to remove the latter. This was followed by relief of circulatory distress, but also by an alarming hemorrhage from the diseased left upper lobe. The latter had apparently been tamponed by the pericardial fluid. When this had to be removed a second time, Wenckebach replaced it by air and thereby prevented (probably) a recurrence of hemoptysis.

Dr. C. H. Vrooman, Kamloops, B. C.: In our sanatorium we got better results in cases of recent onset though fairly extensive lesion. The 6 cases that had favorable results had an average of 7.8 months from onset of active symptoms to the time of treatment by artificial pneumothorax. The long standing chronic case even though unilateral is not in our experience suitable for pneumothorax.

SANATORIUM TEMPERATURE RECORDS

By David R. Lyman, M.D.

Wallingford, Conn.

Some recent investigations which I have made into the question as to the manner in which the temperature records are kept in various sanatoria have convinced me that this subject should receive careful consideration at the hands of our National Association.

My attention was directed to the matter by two cases which came under my care at Gaylord Farm this past winter. They had both been under treatment in other sanatoria for some weeks but, wishing to be nearer home, had applied to us for admission. I communicated with these sanatoria and was told in each case that the patient, though moderately advanced, was in good general condition and was running a normal temperature. They were admitted to Gaylord Farm without examination and under the impression that they could be treated as "shack" cases. Both cases on arrival showed a temperature at 7 p.m. of 100.5 to 101.5 though normal the rest of the day. As the evening temperature did not respond to rest in bed I questioned the patients as to how their records at the other sanatoria had been made, and learned that they had been taken twice daily; in the morning and in the mid-afternoon. Without the evening record both of these cases were apparently of the ambulant type and had been so treated; having both been on moderate exercise. Our records showed these cases to be active and requiring infirmary care. This was given but they failed to respond and one died within a few months while the other has but a short time to live. One could not help wondering whether, if the evening rise had been recorded and the patient put to bed at the beginning of treatment, the subsequent history might not have been different. The temperature records at Gaylord Farm had in new cases, infirmary cases, and cases in which close observation was indicated always been taken at nine in the morning, four in the afternoon and seven at night; the record being of a five minute mouth temperature and all records being made by the nurses. For ambulant cases these records were made every tenth day for five consecutive days and at the same hours.

After the above experience had shown me that the taking of evening temperatures was not a universal practice I decided to find out what (if any) was the general standard for recording temperatures in our leading sanatoria. I sent out inquiries to 28 institutions, all of whom replied; so that, including Gaylord Farm, I had available the routine of 29 sanatoria for this study. The figures will, I think, interest as well as surprise you.

The data showed that, as regards the ambulant cases in these 29 sanatoria, 14 took temperatures twice daily—in the morning and the mid-afternoon—6 were recorded twice daily—in the morning and after supper; 5 took tempera-

tures morning, afternoon and night; 3 took them 4 times daily and 1 took them morning, noon and afternoon.

As regards infirmary cases—10 sanatoria took records morning and afternoon; 6 took them morning, afternoon and night; 6, 4 times daily—2, "as indicated in each case"—2, morning and night; 1, morning, noon and afternoon, and 2 *in the afternoon only!*

As to the manner of taking the temperatures, 21 sanatoria recorded mouth readings; 4 used rectal records only, 3 used rectal readings in the infirmary cases and mouth readings in the ambulant ones, while 1 took axillary readings only.

In 21 sanatoria the readings were made by the nurses or attendants; in five some of the readings were made by the patients; in 3 all patients took their own temperatures.

Several of the replies gave us no data as to the frequency with which control records were made of the ambulant cases, but among the number who did answer this query the practices in vogue varied as follows:—

One day every week, 5 days every tenth day, 2 days every 10 days, 3 days every 2 weeks, 2 days every 3 weeks, 5 days every month, and 2 days every month.

Whenever any one of us writes a paper on the early diagnosis of tuberculosis he lays great stress upon the universal failure of the general practitioner to secure a proper temperature record of his cases; a record which we unite in declaring to be of the utmost importance. And it is. There can be no question as to that.

Suppose that a general practitioner, anxious to give his patients the best advice in his power, were to follow the plan I pursued and write the leading sanatoria for information as to their standards. We have criticized and ridiculed him for a good many years. What sarcasm would he not be justified in using to help tell the tale of how he had turned to his critics, the tuberculosis specialists, for advice as to the best standard on which to base his work, and had found that, in spite of all our preaching, we had no such standard for our own guidance; that in 29 of our foremost sanatoria there was no general agreement as to the best temperature to record, the best way to record it or the best time to secure the readings? We would indeed appear and feel ridiculous. The briefest review of the above data made it very evident to me that our opinions as to the value of the various hours for recording temperatures differ widely. From my point of view the record which took no consideration of the evening temperature made it possible for active cases, like the two which had focused my attention on this matter, to perhaps lose their chance of recovery through imperfect knowledge of their symptoms and yet, if I were right, the figures showed that in 15 of the 29 sanatoria no such evening record was taken. Was there really such a need of the third record, or were my 2 cases merely exceptions? Also, had their evening temperatures been due to the fact that at Gaylord Farm all evening temperatures are taken at 7, just half an hour after supper? Could the influence of the recent meal account for the difference, and was my routine therefore at fault?

To try to secure further light on this I had the temperatures of my 80 adult

patients recorded for 2 weeks on the following plan. All temperatures, both for infirmary and ambulant cases, were recorded 7 times daily—before breakfast and half an hour after the meal; before dinner and half an hour after; at four in the afternoon and before and after supper. All temperatures were mouth readings of at least 5 minutes duration and all were taken and recorded by the nurses. In charting the records the temperatures before meals and at 4 o'clock were charted in *red* ink and the after meal readings in *blue*, so that the contrast would be readily appreciated.

A glance at the charts showed that in 30 this difference, though usually slight, was plainly visible; while in 50 there was no apparent difference. A closer study of these 50 charts showed that while the temperature after a a meal was often half a degree above that immediately preceding it yet it was as often at the same level or even half a degree below; and this lack of any apparent influence of the meal was, to my great surprise, more marked in the infirmary records than among the ambulant cases.

In the 30 cases in which the elevation of the after meal record was plainly evident there were 12 in which the maximum temperature was reached before or between meals sufficiently often so that the usually higher temperature after meals gave no information not otherwise obtainable. In 8 of these cases the maximum recorded was below 99.5; in 2, below 100 and in 2, above 100.

Of the 18 charts in which the temperature recorded after meals would not have been noticed at any other time, 9 showed a maximum below 99.5; 8, below 100 and 1 above 100.

These records would tend to show that the fact that a patient had had a meal within a half an hour of the recording of his mouth temperature exercises less influences than had generally been held; its absence being indicated in 50 out of the 80 charts. They, however, also tended to raise in my mind the question as to whether the temperature after meals, or at least after supper, was not one that should always be taken as often showing a rise which will be in evidence at no other time, just as it is sometimes advised that the temperature in suspected cases be recorded after exercise. Several of the patients in this series suggest this very strongly, for they showed temperatures to 100° or over, noted only after supper and disappearing entirely after a period of rest in bed. The point seems to me worthy of closer study.

I went over the 80 charts seeking for the answer to my question as to whether a record taken twice daily could be considered sufficient and also whether the temperature was more often elevated in the afternoon or in the evening. I found that the maximum temperature was recorded in the morning in two cases; in the afternoon in 22; in the evening in 27; and equally often in afternoon and evening in 29. Certainly one must conclude from these that 2 readings a day are not sufficient for a proper study of a case, either when in the infirmary or at any time during his treatment when a temperature record is indicated at all.

As to the types of temperature taken, there is little question that the rectal temperature is more accurate for the individual reading. I feel, however, that a mouth temperature of 5 minutes duration and taken by the nurse

is of sufficient accuracy for comparison with the same record of the same person on successive days.

It is most important, however, that the records be taken by the nurses or attendants. In my experience, records taken by the patients are utterly unreliable. Even where the patients are of the most intelligent class, there will be many—enough to invalidate the records—who will "fake" their temperatures in order to keep out of bed. When you have had the experience where in one month you have dismissed 2 patients—one a graduate nurse, the other a physician, for not only faking their own temperatures, but instructing their neighbors in the infirmary how to do likewise, your faith in patients' records is gone forever. I find myself heartily in sympathy with Dr. Klotz of the Barlow Sanatorium who says in reply to my query, that when the patients take their own temperatures, even with the best of occasional control tests, he "finds out (usually after the patient had been discharged some time) that false reports had been given," and therefore he is of the opinion that 'the only safe way would seem to be to have his nurses take *all* temperatures, even though it is most time consuming and troublesome."

The wide variation of the routines for control temperature records on ambulant cases is another evidence of our lack of agreement as to the proper procedure to be followed. We know that, as mentioned above, patients will often misrepresent their symptoms in order to escape what they consider needless restrictions. We know too that in tuberculosis the time to treat symptoms of renewed activity is at their first appearance, and yet the routine for temperature readings for ambulant cases after the admission record has been made varies all the way from "one day in each week" to "two days once a month."

We have found that even using the control record every tenth day for 5 days was not sufficient unless we put every patient on temperature for 3 days after his return from a leave of absence of more than 1 day. This we have found to be so important that it is now part of our regular routine.

Whatever may be the individual opinions among us as to the best time and manner of recording temperatures, it is self-evident that so important a factor in the treatment of any case of tuberculosis demands closer attention. We should practice better if we would continue to preach. I have presented this in the hope that the discussion here might lead to some action by this Association tending to establish a uniform standard for the study of the temperatures of our tuberculous patients.

PATHOLOGICAL SECTION

Chairman

WILFRED H. MANWARING, M.D.

Stanford University, Cal.

Secretary

RALPH C. MATSON, M.D.

Portland, Ore.

THE SERUM DIAGNOSIS OF TUBERCULOSIS IN RELATION TO IMMUNIZATION AND PROPHYLAXIS

By Enrico Castelli, M.D.
New York

The attempts made in order to obtain a reliable serum-diagnosis of tuberculosis with the method of complement fixation antedate the discovery of the Wassermann reaction in syphilis. Wassermann and Brouck were able to obtain a positive complement fixation by mixing extracts of tuberculous organs (used as antigen) with an artificially prepared tuberculous serum. On the other hand if the serum employed came from a tuberculous patient, the reaction was negative and was positive only if the patient had been treated with tuberculin. In other words the serum of treated individuals contained in contrast with the untreated ones, an amboceptor which was called by Wassermann the "anti-tuberculine amboceptor," an amboceptor which for the fact of not being spontaneously formed in tuberculous individuals was of no apparent value when found in the blood. Such being the case the serum-diagnosis of tuberculosis was abandoned but the experience gained in these attempts led to the application of the same principle to the study of syphilis.

The serum diagnosis of tuberculosis, abandoned by Wassermann was taken up first by Much and Deyke in Hamburg and Lubeck respectively, and later by Besredka at the Institut Pasteur in Paris. The Deyke-Much attempt was unsuccessful. The abundance of details which always characterize German scientist labors made the conclusion very cloudy, and the clinical point of view or better the aim of the reaction was lost.

The idea of separating the bacillus in its different elements, viz., nastine, albumin, lipoids, and "Rückstand" made them seek a special blood reaction for every one of these elements but the mass reaction was lost. Their serum-diagnosis did not succeed for the same reason that their therapeutic methods did not succeed. Today the treatment of tuberculosis according to the way in which the organism reacts to the mentioned four different elements has been entirely abandoned and the serum-diagnosis is today performed at the Allgemeine Krankenhaus of Lubeck only as a traditional biological reaction absolutely deprived of diagnostic value.

The Besredka reaction is a qualitative reaction for the research of antibodies in the serum of tuberculous patients. When positive it denotes simply that the patient has tuberculosis but without giving us any valuable information about the condition of reactivity of the organism to the infection, but when negative it is of no diagnostic value. In fact in the serious cases of tuberculosis the reaction is always negative. Others have tried the reaction of complement fixation in tuberculosis.

All the biological work done until now in the serum-diagnosis of tuberculosis with the method of complement fixation has demonstrated the possibility of showing the presence of antibodies in the serum of tuberculous subjects. But it happens very often that in testing the blood of a patient affected by tuberculosis clinically proved we obtain a negative reaction for the research of antibodies. As we cannot ascribe the failure of the demonstration to a faulty technique, we must in these cases admit, that the tuberculous organism, because of its deficient resistance, does not manifest a reaction of defense sufficient to put in circulation the amount of reactive substances necessary to produce a biological reaction. In these cases the biological diagnosis fails. But if in every reaction, besides antibodies we should succeed in demonstrating also the antigens we would always have a positive reaction when any degree whatever of tuberculous infection exists in the serum examined. Then if besides a qualitative reaction we can establish also a quantitative one, that is to say, establish the titration of antigens and antibodies present in the serum we shall be in condition to form not only a diagnostic but also a prognostic opinion on the infection and obtain what I decided to call the "potential of organic reaction," viz., the proportion between antigens and antibodies in the serum. It is this special modification to the serum-diagnosis that I want to explain. The clue to this improvement in the serum diagnosis of tuberculosis lies in the fact that while it was easy to create a reagent for the production of antibodies as tuberculin, toxins, bacillary emulsion, etc., it was very difficult to find a biological reagent for the production of antigens, because this reagent must be a serum containing only antibodies, viz., a pure antibody serum. The student of biology knows that so far nobody has been able to produce a reagent containing only antibodies, as any immune serum which can be used will contain in different proportions antigens and antibodies, so that it is impossible for us to create a pure antigen reaction. But we succeeded in obtaining a pure antibody serum by depriving by a special process the immune serum of the antigen contained in it. The time is too limited for me to show you all the phases of this process, so I am going to explain at once the technique of the reaction and it will be easy for you all to realize of what importance it has been to us, inasmuch as the possibility of dosing antigen and antibodies in a serum has allowed us to measure in every case not only the degree of infection but also the degree of immunization. It is owing to this serum diagnosis that we have been able to make a step forward in the study of immunization against tuberculosis.

The process used in order to obtain a pure antibody serum is the gradual exhaustion of the antigens contained in the serum in presence of an excess of alexin.

Technique.—The usual technical procedure of Bordet-Genzou, as it is adopted today, is not free from many sources of errors which have led to a faulty interpretation of the reaction and have generated loss of confidence in its value. It is for that reason that we have introduced special modifications in the technique which have made our results absolutely reliable and certain. Our procedure is based on the fact that the results of complement fixation are dependent upon two factors which are in *perfect antagonism to*

each other. These two factors are: the hemolytic factors which tend to mask the real results of complement fixation and the antihemolytic factors which can simulate results of complement fixation not warranted. As a result of this biological conception we have come to the conclusion that in order to obtain reliable results it is necessary to create a perfect functional equilibrium between the different factors which play a rôle in the reaction.

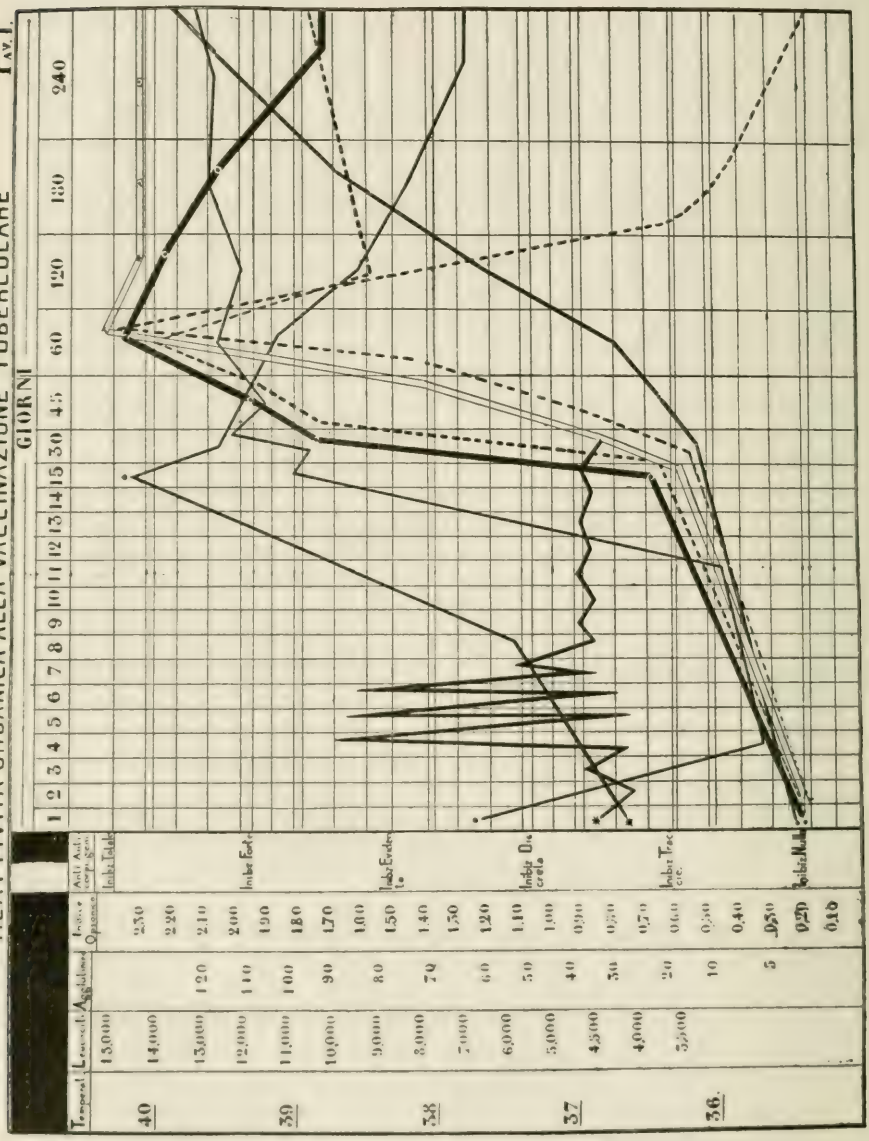
The phenomenon of complement fixation must develop itself in the presence of alexinic units which we determine every time according to the hemolytic and antihemolytic properties of each reagent. The practical consequence of our biological conception is the necessity of the exact titration of the complementary value of the alexinic serum to be used and the determination of the so called alexinic unit. We understand by alexinic unit the minimum of alexinic serum necessary and sufficient to dissolve a determined volume of red corpuscles in presence of an excess of hemolytic serum. We determine the alexinic unit in the physiological solution of sodium chloride and call it the *fundamental alexinic unit*, but as we use in the reaction of complement fixation substances sera, emulsions, etc., which can also manifest antihemolytic powers, it becomes necessary to determine also the antihemolytic powers of all these reagents in order not to have faulty results in the reaction.

Owing to the fact that the correction of the antihemolytic powers can be obtained either with alexin or hemolysin or with both together, if we use in the different reactions a multiple of hemolysin, we will find the different secondary alexinic units of the substances examined which enter into the reaction as antigens or antibodies. After we have once determined the difference existing between the fundamental alexinic unit and the single secondary alexinic units, we proceed to the proof of complement fixation in the presence of the new alexinic unit whose value is the result of the sum of the secondary alexinic unit minus the value of the fundamental alexinic unit. This alexinic unit will be called the definite alexinic unit.

1. *Blood Serum.*—We obtain the blood from the vena cava and collect it into a sterile test tube and allow it to coagulate. The clot is then separated from the sides of the tube by a sterile glass rod or platinum needle, the serum is transferred into another tube and inactivated at 56°C. during half hour, and the tube is then plugged with absorbent cotton and placed into the ice chest.

2. *Antigen.*—We use as antigen an extract of tubercle bacilli which we call bacillary pulp. We prepare of this antigen a dilution and titration. The bacillary pulp (polpa bacillare) which we classify under the name of liquid-a., is prepared in the following manner: We take 18 cultures of tubercle bacilli and filter them. When all the fluid has passed through the paper filter we gather the mass of bacilli and put them in a mortar with the addition of bicarbonate of sodium and camphor and grind them thoroughly, adding as a solvent $\frac{1}{2}$ liter of distilled water. After that we put the whole in an Ehrlenmeyer and set it in the thermostat during 24 hours.

After 24 hours we refilter the contents of the Ehrlenmeyer, place the mass of the bacilli again in the mortar adding sand, and grind the bacilli again, using as liquid the filtrate. We leave the whole in the thermostat during 24


REATTIVITA ORGANICA ALLA VACCINAZIONE TUBERCOLARE
Tav. 1.
GIORNI
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 30 45 60 120 180 240
Temper.
Leucocit.
Agglutinaz.
Indice Opsonico
Anti Anti comp. spec.
Indice Tolab.
Indice Fab.
Indice Evolen te
Indice Du creto
Indice Tuc cec
Indice Mull.
40
39
38
37
36.

hours. After boiling the residuum we add distilled water to three times its bulk, filter again, heat the residuum to 80°C. and finally pass through the Chamberland cylinder filter.

Bacillary pulp is a 10 per cent. solution of tuberculous nucleo-proteins, viz., bacilli, 100, in pulp, 1000.

3. *Antibodies.*—We use as antibodies an antituberculous immune which has been previously deprived of antigens through the process of the fractional exhaustion of the antigens in presence of an excess of alexin.

4. *Alexin.*—We use as alexin the serum of the guinea pig which has been separated from the coagulum and kept in the ice box during 24 hours.

5. *Hemolysin.*—We use hemolysin of which we know the hemolytic unit: but we use anti-ox hemolysin instead of the anti-sheep hemolysin, as the human blood serum has antihemolytic spontaneous powers toward the sheep red corpuscles. We could have hemolysis owing to the fact that besides the hemolytic system used as reagent another hemolytic principle exists represented by the *spontaneous hemolysin* of the human serum.

The special feature is *an immune phenomenon*, and is the expression of something that we cannot grasp concerning the spontaneous hemolytic properties of some animals towards the red corpuscles of other animals. It is following this knowledge, that the French biologists have studied anaphylaxis of antidiphtheritic serum.

This is also the reason why the Wassermann reaction, even if performed with a perfect technique, must be considered unreliable if anti-sheep hemolysin is used. As the majority of those doing laboratory work in New York use anti-sheep hemolysin we must consider their results as not absolutely reliable.

What I say about the spontaneous antihemolytic power of the human serum towards sheep red corpuscles is specially true of the Latin races compared with the Teutonic and Anglo-Saxon races. It is probably due to the fact that these two races are meat-eaters in a much higher degree than the Latin races.

One can easily verify my statement by comparing the results of Wassermann reactions performed on the same blood with different hemolysins.

6. *Ox-blood.*—We use the emulsion of blood corpuscles in a 5 or $2\frac{1}{2}$ per cent. dilution.

Reaction.—Before beginning a test we must first determine the alexinic unit, viz., the minimum of alexin necessary to dissolve 1 c.c. of red corpuscles in presence of an excess of hemolysin.

To do that we proceed in the following manner: We take 30 test tubes and in every one of them we put 1 c.c. of red corpuscles (5 per cent. solution or less), 1 multiple of the hemolytic unit, 1 c.c. of physiological salt solution. We then add alexin in 1:20 solution in quantities progressively rising from: 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, in the 30th tube.

We bring the total volume of each tube to 5 c.c., adding the necessary quantity of physiological salt solution, and we put everything in the thermostat at 37°C. where we leave it during 3 hours, taking the precaution of shaking the tubes every hour.

After the 3 hours have elasped we read the reaction and the first tube in which we notice total hemolysis constitutes the alexinic unit in the physiological solution. What we have done for the physiological solution we must do for all reagents entering into the reactions; so we must find: the alexinic units for the antigen, the alexinic units for the antibody, and the alexinic units for the serum to be examined.

This is absolutely necessary on account of the different properties of the reagents. We might find in them special anticomplementary powers which would obscure the reaction in the fundamental proofs and create serious error of interpretation. So we repeat for the different reagents entering the reaction what we did in the research of the alexinic unit in the physiological salt solution. We make as many series of proofs as the number of the elements to be used. We designate as fundamental alexenic unit, or A1, the alexinic unit in the physiological salt solution.

In order to correct the anticomplementary power of the serum, antigen, or antibody to be used in the reaction we add to the fundamental alexenic unit the excess of alexin necessary to give hemolysis in the serum, antibody, or antigen to be used in the reaction.

For example we want to test the anticomplementary power of an antitoxic serum (antibody). We make a dilution of this serum 2:10 and as we did in research of the alexinic unit in the physiological solution we prepare a series of test tubes in which we put antitoxic serum, red corpuscles, hemolysin plus dilution, 1:20, in progressive quantities from 0.05 to 1.50 plus physiological salt solution and after the usual time in the thermostat we read the reaction.

1. If the antitoxic serum (antitoxin) has anticomplementary properties it will give an anticomplementary reaction which will be revealed by the fact that in order to obtain a complete hemolysis in the different test tubes it has been necessary to use a quantity of alexin superior to that necessary to give hemolysis of 1 c.c. of red corpuscles in physiological salt solution.

2. The quantitative valuation of the anticomplementary power of the antitoxic serum is given by the difference between the quantity of alexin used in order to produce hemolysis in the antitoxic serum and one used to produce hemolysis in the physiological solution.

3. To correct the anticomplementary power of the antitoxic serum to be examined in the final reaction we must add the fundamental alexinic unit this difference in excess of hemolysin which is needed by the serum in order to obtain complete hemolysis.

Example.—Alexinic unit in the physiological solution is equal to 0.50 of alexin (dilution 1: 20); alexinic unit in the antitoxic serum examined (dilution 2 : 10); is equal to 0.80 of alexin (dilution 1 : 20); anticomplementary power of the serum examined is: 0.50 − 0.80, equal to 0.30 of alexin (dilution 1 : 20); correction is made by adding to the fundamental alexinic unit 0.30 of alexin (dilution 1 : 20). This new alexinic unit constitutes the *definitive alexinic unit*, of the antitoxic serum (antibody). The same procedure is used for the different antigens and for the patient serum.

Let us assume we have obtained the following *secondary alexinic units for the different reagents to be used in the reaction:*

1. For the physiological salt solution the quantity of alexin necessary is 0.50 c.c., dilution 1 : 20.

2. For the antitoxic serum (antibody) the quantity of alexin necessary is 0.80 c.c., dilution 1 : 20.

3. For the bacillary pulp (antigen) the quantity of alexin needed is 0.85 c.c., dilution 1 : 20.

4. For the patient serum to be examined the quantity of alexin needed is 0.85 c.c., dilution 1: 20.

Determination of tuberculous antigens in the serum to be examined. The reaction will be prepared in the test tube as (1) Patient serum, 1 c.c. of the dilution 2 : 10; (2) antibody (antitoxic serum) 1 c.c. of the dilution 2 : 10; (3) alexin, 1.15 c.c. of the dilution 1 : 20 which corresponds to the sum of the fundamental alexinic unit *plus* the *difference in excess* of alexin, calculated in the following manner:

Fundamental alexinic unit.....0.50 c.c., U. A., 0.50
Secondary alexinic unit, U. A." of the patient serum.....0.85 c.c.
Difference in excess of alexin from U. A.....0.35
0.50
U. A." of antibody (antitoxic serum).....0.80 c.c., 0.35
Difference in excess from U. A.....0.30
Total.....1.15

or adopting another way of calculation: U. A." patient serum *plus* U. A." antibody *minus* U. A. viz., in our case, 0.85 *plus* 0.80 *minus* 0.50 *equals*: 1.15 c.c.

Determination of tuberculous antibodies in the serum to be examined:—The reaction will be prepared in the test tube as follows: (1) patient serum 1 c.c. of the dilution 2 : 10; (2) bacillary pulp, 1 c.c. of the dilution 2 : 10; (3) alexin 1.20 c.c. dilution 1 : 20 which corresponds to the sum of the fundamental alexinic unit *plus* the difference in excess of alexin calculated in the following manner:

Fundamental alexinic unit.....0.50 c.c., U. A., 0.50
U. A." of the patient serum.....0.85 c.c.
Difference in excess of alexin from U. A.....0.35
U. A." of bacillary pulp.....0.85 c.c.
Difference in excess of alexin from U. A.....0.35
Total.....1.20

or adopting the other way of calculation: U. A." patient serum *plus* U. A." antigen *minus* U. A. viz., in our case, 0.85 *plus* 0.85 *minus* U. A. (0.50) equal to 1.20.

These test tubes are put in the thermostat having previously evened up the amount of liquid in the tubes with physiological solution. After 2 hours in thermostat at 37°C., shaking the test tubes every hour, we add to the contents of each tube: 1 c.c. of red corpuscles emulsion; 1 c.c. solution of hemolysin containing the same hemolytic unit as the one used in the preceding reactions for the determination of the alexinic units.

After 2 hours in the thermostat interrupted by the shaking of the tubes every hour, we read the results of the reaction.

Following this procedure, even the smallest traces of complement fixation have an absolute value, because these traces of complement fixation indicate a subtraction of complement from the systems *red corpuscles-hemolysin* of complement fixed during the first phase of the reaction from the systems *Antigen-Antibody* present in the menstruum.

As we employ the same antigen and antibody in all the reaction it is a good rule, in order to avoid an unnecessary loss of time in the determination of U. A.", to adopt the following precaution:

We determine the U. A." of a determined quantity of material that we keep in the ice chest (serum or emulsion). *Let us admit that the U.A." is 0.50 while the U. A. is 0.35*—if we have to repeat our reaction several times with this same material, but at short intervals, we do not need to determine again the U. A." of said reagent but we determine only the U. A. of that day in which we do the reaction and proceed in the following manner:

Assuming that the U. A. of the day is 0.40 we establish the following proportion:

$$0.50 \text{ (U. A.")} : 0.35 \text{ (U. A.)} :: X : 0.40 \text{ (U. A. of the day)}$$

$$0.50 : 0.35 :: X : 0.40$$

$$X = \frac{0.50 \times 0.40}{0.35} = 0.57$$

That is to say, *0.57 of alexin dilution 1 : 20 represents the U. A." of said* antigen or antibody referred to U. A. of the day in which we work.

In presence of a patient affected by pulmonary tuberculosis we find it always necessary to consider the fact that other infections may eventually be associated with tuberculosis. We know that very frequently tuberculosis does not remain a pure clinical entity, that on account of the diminished resistance the organism becomes a good receptor for other germs, which will either overwhelm the action of the tubercle bacillus, giving to the syndrome a special characteristic of their own, or in elaborating toxin in association with the tubercle bacillus will create a very complex syndrome in which it would be difficult to establish what is due to the tubercle bacillus and what to the associated germs.

The most frequent association of the *Bacillus tuberculosis* is with the *streptococcus*, *staphylococcus*, and *diplococcus*. From this the necessity arises of finding adequate means to differentiate in the forms of *associated tuberculosis* the syndrome originated by the specific germ and the one due to the associated ones.

The new discovery of biology regarding the property of the organic sera has opened the way for new methods of investigation and in applying the methods of complement fixation with a special technique, we have determined in tuberculous patients with microbic associations, the way of reacting of the organism in the pressure of the different toxemias, viz., tuberculous, streptococcic, staphylococic, and diplococcic.

With our technique we have determined: (1) The evidence in the sera examined of tuberculous and associated antigens and antibodies. (2) The prevalence of antigens on antibodies and *vice versa* either tuberculous or associated.

For the determination of antigens and antibodies in the sera we have used an indirect criterion which has allowed us to obtain the results desired.

The fact that all the sera examined always gave a positive reaction when tested for tuberculosis and the associated infections (streptococcus, staphylococcus, diplococcus) made us think that we were in presence of what we call a group reaction. The differentiation between what belongs to the specific reaction and what belongs to the group reaction has been realized by a special technique of ours which consists in *testing the blood serum to examine towards antigens and antibodies using proportionately increasing quantities of said serum.* If we are in presence of a specific reaction in augmenting the quantity of serum, we increase the intensity of the reaction, while in a group reaction this would not occur.

In other words we detect the specific principles, antigens *and antibodies contained in a serum by using it in progressively increasing quantities in the pressure of constant quantities of the corresponding antigens and antibodies.*

Using this technique we obtain a more evident specific reaction. Applying to these researches the Bordet-Gengou method modified we have been able to determine

1. A comparison between the degree of multiple infection (demonstration and valuation of the multiple antigens) and the degree of the corresponding organic reactions (demonstration and valuation of the multiple antibodies.
2. The coefficient of organic reaction.
3. To formulate the therapeutic indications necessary to reëstablish in the organism the equilibrium between offense and defense, through the adapt elaboration of new antibodies.

As a conclusion we can say that by determining in which proportions the serum of a tuberculous subject manifests the biological reaction of Bordet-Gengou in presence of the different species of antigens and antibodies, we can approximately establish the degree of intensity of the different toxemias and the corresponding degree of organic defense. We can also establish for every single case a species of diagram demonstrating the comporting of the organism in presence of the complex infection produced by the tubercle bacillus and its associates.

With the same technique we have been able to demonstrate the presence of the different antigens and antibodies in the different organic fluids and secretions so to be able to conclude that the method of Bordet-Gengou properly modified allows us to demonstrate the tuberculous antigens and antibodies: (1) In the blood serum of tuberculous patients; (2) in the serum of subjects having undergone immunizing treatment; (3) in the cerebro-spinal fluid of subjects affected by tuberculous meningitis; (4) in the peritoneal fluid in tuberculous peritonitis; (5) in the sputum; (6) in the urine.

We can also say that the method of complement fixation as we have modified it and applied it to tuberculosis has solved the problem of the early diagnosis of this disease.

VALUATION OF ANTIBODY POWER OF THE IMMUNE SERUM

To make the demonstration clear we call (A) the immune bacteriolytic serum and (a) the corresponding antigen. In the first phase of the reaction we proceed to the determination of the alexinic unit in:

1. *Physiological solution,*
2. *Immune serum* (A),
3. *Antigen* (a),

which consists in establishing a series of test-tubes 10–20 in which 1 c.c. of red corpuscles (5 per cent. solution), 1 c.c. hemolysin containing a multiple of the hemolytic unit, and progressively increasing quantities of alexin (solution 1 : 20). The tube in which we have had complete hemolyis of the substance tested.

Suppose our results to be the following:

Alexinic unit in the physiological solution, 0.35 dilution 1 : 20.

Alexinic unit in the immune serum (A) 0.50 dilution 1 : 20.

Alexinic unit in the antigen (a) 0.60 dilution 1 : 20.

We prepare then the following dilutions of the immune serum (A):

1st dilution, 1 : 10
2d dilution, 1 : 100
3d dilution, 1 : 1000
4th dilution, 1 : 10,000
5th dilution, 1 : 100,000
6th dilution, 1 : 1,000,000
7th dilution, 1 : 10,000,000

After that we prepare a series of 64 test tubes disposed in 7 rows, the first containing 10 tubes, the other containing 9 corresponding to the above dilutions.

In each test tube we put: 2/10 of c.c. of the antigen (a); 1 c.c. of the immune serum (A) dilution 1 : 10 in the first tube of the first series, and decreasing quantities in the following, viz.: 0.90, 0.80, 0.70, 0.60, 0.50, 0.40, 0.50 up to the tube N. 10.

We do the same for the other dilutions in the following series of tubes and we add then: alexin making the usual calculation: U. A.″ (A) 0.50 *plus* U. A.″ (a) 0.60 *minus* U. A. 0.35, 0.50 *plus* 0.60 *minus* 0.35 equal to 0.75. We bring the contents of each tube to 3 c.c., we set them in the thermostat at 37° during 3 hours, having the precaution of shaking the tubes every hour and we add after: 1 cc. red blood corpuscles (5 per cent. dilution); 1 c. c. hemolysin (multiple of hemolitic unit).

After 3 hours in the thermostat at 37° we practice the reading. If the serum has a real antibody value we will always be able to observe the following facts:

In the first series of tubes we have total inhibition.

In the second series of tubes we observe that the inhibition is gradually diminishing, reaching in the last tubes the complete hemolysis.

In the third series of tubes we observe a constant total hemolysis.

The first series of tubes shows that the immune serum (A) forms with the antigen (a) systems sufficient to deviate all the alexin present.

If for example we should obtain a total inhibition in the tube containing 0.10 of serum dilution 1/1000 that means that if 0.10 of serum dilution 1/1000 gives total inhibition (antibody unit) 1 c.c. of immune serum (A) contains evidently 10,000 units.

The second series of tubes shows that the antibodies contained in the following dilutions are not in sufficient quantity to produce with the antigen (a) the total deviation of the complement.

The last tube in which we notice traces of inhibition will show the title of the dilution necessary to still show in the reaction the antibodies.

So supposing that we have still traces of inhibition in the tube 97 and total hemolysis in the tube 98, we will then know that we are able with the method of the complement fixation to reveal traces of antibodies in the dilution 1,100,000 of the immune serum "(A) examined.

The third series of tubes show that we are unable to detect even traces of antibodies in dilutions of the immune serum superior to the title 1 : 1,000,000.

What we have done for the demonstration of the antibodies in the serum we can do in the same way for the demonstration of the antigens. We must remind at this point the importance that inactivation has in the preservation of sera, the immune serum once gathered if not at once inactivated loses gradually its immune qualities because the alexin contained in the immune serum completes the systems formed between the amboceptors and antigens contained in the serum itself. For that reason the degree of immunization of the serum diminishes; this diminution of the "antibody power" is in direct relation with the contents of antigen of the serum.

But if we inactivate the serum immediately after it has been gathered, we prevent the formation of systems between antigens and amboceptors contained in the serum, and to have in this way a serum which contains more antigens and more antibodies.

It is consequently necessary in order to obtain a pure antibody serum to exhaust all the antigens contained in the immune serum. We obtain that by saturating the immune serum with an excess of alexin.

DETERMINATION OF THE POTENTIAL OF ORGANIC REACTION IN A TUBERCULAR SERUM

In order to determine the potential of organic reaction of a tubercular serum we must proceed to the titration of the antigens and antibodies contained in the serum.

The technical procedure is the following:

We prepare dilutions of the serum to examine containing the following quantities:

1st test tube-serie 1 c.c. physiolog. sol. containing 2/8 of pure serum.
2d test tube-serie 1 c.c. physiolog. sol. containing 2/18 of pure serum.
3d test tube-serie 1 c.c. physiolog. sol. containing 2/28 of pure serum.
4th test tube-serie 1 c.c. physiolog. sol. containing 2/38 of pure serum.
5th test tube-serie 1 c.c. physiolog. sol. containing 2/48 of pure serum.
6th test tube-serie 1 c.c. physiolog. sol. containing 2/58 of pure serum.
5th test tube-serie 1 c.c. physiolog. sol. containing 2/68 of pure serum.
8th test tube-serie 1 c.c. physiolog, sol. containing 2/78 of pure serum.
9th test-tube serie 1 c.c. physiolog. sol. containing 2/88 of pure serum.
10th test tube-serie 1 c.c. physiolog. sol. containing 2/98 of pure serum.

These different dilutions are put in presence of the antibody serum in order to detect the antigens, and in presence of an antigen serum in order to detect the antibodies contained in the serum to examine.

The comparison of the opposite reactions in the different solutions and the degree of intensity of the reaction, will show the condition of reactivity of the patient whose serum we examine. In performing the reaction we must not forget to follow the already mentioned technical precautions, the most important of which is:

Prompt inactivation of the serum after it has been in the ice chest in contact with the coagulum during 24 hours.

We must not forget that the reaction that we want to demonstrate with the method of Bordet-Genzou modified is the same that takes place in the serum itself once separated from the coagulum and it is sufficient a delay in the inactivation to make our reaction unreliable and imperfect.

CONCLUSION

As you see our method of serum-diagnosis differs from any other method applied until today, for the fact that we make not only a *qualitative* diagnosis of tuberculosis but also a *quantitative* one. We establish the titrations of *antigens* and *antibodies* in the sera and secretions and we establish the exact rapport existing between infection and defense or what we decided to call: the *potential of organic reaction.*

Being able to do that, we have also been able to measure the *degree of immunization of any organism.* The process of immunization in itself is a simple one, but the empiric way used in its application has always been the cause of its unreliability.

a. How much tuberculous material is it necessary to introduce in the organism in order to obtain a complete immunization, understanding for complete immunization; A condition of organic reaction of the organism in which the quantity of elements of defense against the infection (antibodies) present in the serum, is above the quantity of element of offense (antigens). (One thing is to be immune and another is to be immunized.)

b. Which is the relation between quantity of tuberculous matter and degree of immunization?

c. How long will the immunization of the organism last? All these questions are today answered by the serum diagnosis establishing the titration of antigens and antibodies in the blood serum of subjects undergoing immunizing treatments.

Using the serum diagnosis as the thermometer measuring infection and defense we have been able to study the questions of the rapeutic and prophylaxis.

QUESTIONS OF THERAPEUTICS

We have been able to demonstrate why all immune sera used until now by the different serologists gave unsatisfactory and unreliable results. The chart on *vaccination in all possible cases* will explain it to you. The chart demonstrates a process of immunization obtained through a method of vaccination of our own and of which you see the two specimen one for animals and one for human beings.

Admitting, in order to be fair to all the serologists, that all anti-tuberculous sera are good, because produced following the logic processes of immunization, still we must realize one fact which is graphically explained to you here.

When we immunize a perfectly healthy organism, we obtain as a result the production in this organism, after a period of about 90 days of a *biological change* represented by the presence in the blood serum of antigens and antibodies in different proportions. This proportion varies from 1 : 2 to 1: $3\frac{1}{2}$. This condition of the blood serum represents the *condition optima* of any serum prepared by immunizing healthy animals and in order to obtain a curative serum. Then you realize that in order to obtain a beneficial effect from a serum whatever we must create and maintain these conditions of biological equilibrium in the organism. So if we find ourself confronted with a patient which owing to the fact of the infection, contains in its serum a proportion of antigens to antibodies of 1 : 12 and we inoculate an *antitubercular* serum, par example the Marmorec Serum, which at its best may be represented by the proportion 1: 3, in order to increase the antibodies from 1: 4 we must bring the antigens from 12 : 13 so not only we do not succeed in neutralizing the infection but we increase the toxemia.

All the cases on the right of the black line are in the same predicament, viz.: of seeing the toxemic conditions grow worse after the serum-therapeutic treatment.

The conclusion we must reach from this simple observation is, that serum-therapeutics which is a form of active immunization can only be available when the two systems antigenes antibodies contained respectively in the blood serum of the tubercular organism and in the immune serum inoculated, in coming together they form a third system in which the quantity of antibodies prevails over the quantity of antigenes.

This is the only condition which fulfills the requirements of a logic, well conducted and beneficial serum-therapeutics. When by our method of serum diagnosis we know a priori that such condition cannot be reached it is not only useless but deleterious to the organism to apply the treatment.

How can we then resolve the problem of therapeutics, if every time we are called upon to treat a patient we have first to solve a biological equation? We cannot of course ask all the practitioners to become biologists, because we must not forget that every patient represent a new biological problem from the point of view of therapeutics. Even with all our good will we would find our task immensely difficult. We have brought our attention to two things first the *preparation* of immune sera and material of immunization,

which is a technical question of great interest to us but tedious to explain, second the question of the method of *administration.*

We have noticed that in treating tubercular patients by administering antitubercular sera specially prepared, *per via gastrica* at the biological analysis of the blood serum we find no presence of antigenes. In trying the same method on animals in order to be able to have a post mortem, we noticed the presence of antigenes in the liver, evidently they remain and supply the organism when necessary in order to stimulate continuously the production of antibodies. If that should not happen we would only have a passive immunization instead of an active one.

The patients treated in that way show after a certain period of time diminution of all the toxanemic symptoms first, and then diminution in the intensity of focal processes.

But I must acknowledge that this improvement is only noticed in the patients who respond to our biological test giving a formula of almost equilibrium, in the potential of organic reaction. This fact will prove that patients already in condition of discompense must be treated differently viz: *passive immunization* until an *artificial equilibrium* in the formula of the potential of organic reaction is reached, and then *active immunization* per via gastrica. So the question of serum-therapy as it stands today must be entirely changed in its methods of diagnosis and treatment.

But in our endeavor we did not expect to solve the problem of treatment but we thought instead to bring our attention to a more vital question, viz: the *question of prophylaxis.* To cure a disease is certainly a great achievement but to destroy it is the only victory against any infection. And all our efforts have been brought to the solution of the problem of prophylaxis. The faculty of Genoa made rich in experience and wise in the methods of applying the principles of immunization through the mistakes made by others, brought again to light the question of vaccination which had been conceived for the first time by Maragliano in 1903 and Behring after. Having the serum diagnosis as test for the immunization it could be possible to see that a vaccine specially prepared by us made with the dead bacillus has the same biological value of the one made with a live or sensitized bacilli, *but minus* the facts of septic infiltration sometimes very serious which compelled our predecessors to stop all the trials on vaccination in animals and human beings as well. We have performed the *vaccination* in all possible cases which we could clinically conceive and we have seen that the organic reactivity of an healthy organism to the vaccination follows the course described graphically by this chart.

The immunization is complete and we have already marked cases in which vaccination performed 4 years ago, shows yet a biological formula of a well compensated organic reactivity. We have inoculated monkeys previously vaccinated against tuberculosis with the bacillus of tuberculosis and observed no clinical changes in the organism except a temporary hyperthermia followed by a modification in the biological formula with increase of the organic index of reactivity.

We have vaccinated pregnant women and pregnant animals and we have obtained products of conception absolutely immune when treated with our method.

We have noticed the presence in the milk secretion of nursing females of the anti-tuberculous antibodies. The question of the possibility of producing immunized milk has been the one to which we have brought all our attention, as it is admitted today not as an opinion but as a clinical axiom that tuberculosis may be considered as an intestinal infection of infancy, which remains latent for some time to develop at different periods of adult life according to the condition of hygiene and physical resistance of the subject infected. We must admit also that the infection is principally absorbed through milk because milk constitutes the principal and for a long time the only element of infant diet. Such an assertion would again open the discussion on the unity or plurality of the bacillus of tuberculosis but from the point of view of prophylaxis the fact remains that as we immunize the animal with human tubercle bacillus, the blood serum and the secretions of the immunized animal will contain antibodies specific to human tuberculosis, specific substances of defense against human tuberculosis, so if we could adopt for the feeding of infants milk immunized either by the immunization of the animal supplying it or by vaccination of the mother or better by both procedures we would eliminate the principal source of infection.

We know besides that up to the age of 6 months the organism seems to be free from any acquired manifestation of tubercular infection. The age to be free from any acquired manifestation of tubercular infection. The age from 1 to 6 months constitutes a period of natural immunity connected with an undeveloped function of the organism.

It is in this period of natural immunity that we must store the new organism with all the material of defense necessary to react to the future infection which he is liable to be exposed. It is at that age from 1 to 6 months that the prophylaxis of tuberculosis will reap the greatest successes.

The baby made immune through the vaccination of the mother and kept in condition of active reactivity against a possible infection of tuberculosis through the feeding with immunized milk and through vaccination is a victim stolen forever from tuberculosis.

The transformation of farms in farms supplying immunized milk will be the first serious and logic step towards the prophylaxis of tuberculosis in infancy and defense in adult life.

In the province of Genoa we have succeeded in training a group of farmers to the processes of immunization of animals, supplying them with the necessary material of immunization, convincing them and proving that the milk does not change in taste, in its nourishing or productive qualities. To encourage them we are gone so far as binding ourselves to buy from them the milk which should not be sold, which we transform through an essicator in powdered milk which maintains indefinitely the same properties of immune milk when diluted in 9 volumes of water to the 1 volume of powder.

Children and adults fed with it prove through our test of becoming gradually enriched with the products of defense of tuberculosis in their blood serum.

CONCLUSION

We feel that we are in condition to master in a logic and systematic way the problem of prophylaxis of tuberculosis and that we have acquired a better understanding in the questions of treatment.

The faculty of Genoa was planning the opening of a campaign against tuberculosis using as promoters the different boards of healths through the Italian territory with the following program:

(a) An extensive and methodic use of serum diagnosis in hospitals, dispensaries and in private practice which would facilitate an early diagnosis of the disease and an easier control of it.

(b) Having proved the absolute harmlessness of vaccination, compulsory vaccination of babies under 6 months of age.

(c) Advisory vaccination of pregnant women and of adults.

(d) Creation of farms supplying immunized milk for the exclusive use of children or of people showing evidence of tubercular infection.

(e) Vaccination of pregnant cows so to have immunized products of conception, and vaccination of the products of conception as a further precaution against contagion.

What worries us is not the fear of not making good our expectations but that the natural skepticism of the profession at large and of the layman in particular will not help our efforts. The School of Genoa is convinced that by applying and organizing to the prevention of tuberculosis all the means at our disposal in less then 50 years from now we would accomplish in tuberculosis what Jennerism did in smallpox.

You may think that I, and with me all the collaborators of Genoa faculty, we are obsessed. We do not mind that providing that we may convince you that our work has been a serious work, a conscientious work, having only one object, aiming only at one glory, the one of accomplishing something good, useful and lasting.

IMMUNITY IN TUBERCULOSIS

By G. Burton Gilbert, M.D., and Gerald B. Webb, M.D.

Colorado Springs, Colorado

In previous papers we have given the details of three experiments which showed that blood-platelets added to a lethal dose of tubercle bacilli appear to modify the course of infection or to prevent it. It was hoped that this procedure might make possible the inoculation of living tubercle bacilli for the purpose of vaccinating against tuberculosis. Subsequently 4 further similar experiments were undertaken. In these a thick emulsion of pure blood-platelets (obtained from both normal and tuberculous pigs) in citrated salt solution was incubated for half an hour after being mixed with a known number of living tubercle bacilli and then inoculated subcutaneously into guinea pigs. The results were neither uniform nor constant and infection occurred in a sufficient number to make the method neither practical nor safe.

For some years we have been deeply interested in the part played by the lymphocytes in nature's defense against tuberculosis. Each year we have been more impressed with their importance in this disease. Whether their sole method of action rests in the production of a lipolytic ferment which can dissolve the wax of the tubercle bacillus, as first demonstrated by Marie and Fiessinger remains to be determined.

The work here reported consists of a series of five experiments in which a fresh emulsion of lymphocytes was added to a known number of living tubercle bacilli and the mixture then inoculated into guinea pigs.

The lymphocytes for this purpose were obtained by injecting 4 cc. sterile Ringer's solution into the abdominal cavity of full grown guinea pigs. After 10 minutes some of this fluid was removed in capillary pipettes and immediately mixed with the bacilli. Both normal and tuberculous pigs were used. The peritoneal fluid was found to contain about 90 per cent. mononuclear cells at the end of 10 minutes. Considerable difficulty was encountered at first in the formation of fibrinous clots which collected the cells together leaving a clear fluid. This was overcome by having the given number of bacilli picked out and ready for mixing in separate capillary pipettes, no tendency to clot now appeared after they were mixed even when incubated for 20 minutes at 37°C.

Of the 15 pigs which were successfully inoculated with the mixture of lymphocytes and tubercle bacilli only 4 pigs entirely escaped infection. In the 8 pigs which were given control inoculations without any lymphocytes 2 pigs escaped infection. The extent of the infection was practically the same in both sets of pigs.

These experiments show that any definite action of the lymphocytes in diminishing the virulence of the tubercle bacilli was apparently lacking.

In this as in all our research work we are greatly indebted to the generosity of Mr. and Mrs. B. C. Allen, Colorado Springs.

THE FUNCTION OF THE SPLEEN IN THE EXPERIMENTAL INFECTION OF ALBINO MICE WITH BACILLUS TUBERCULOSIS*

By Paul A. Lewis, M.D. and Arthur Georges Margot

Our previous experiments in this field have led to results which may be summarily stated as follows:

1. The removal of the spleen from albino mice increases their resistance to infection with the tubercle bacillus.[1]

2. If fresh spleen be fed to splenectomized mice the animals develop an acute intoxication at least under certain conditions. In splenectomized mice fed with fresh spleen (sheep or mouse), the increased resistance to infection with the tubercle bacillus due to the splenectomy, is either not developed or is obscured by the complicating factor of the acute intoxication which has just been mentioned.[2]

The possibility presented by these experiments that a definite function of the spleen could be restored by the feeding of the fresh organ seemed of sufficient importance to warrant further study. We have taken up therefore the study in greater detail, of the acute intoxication referred to. The results of these experiments form the first portion of the present paper. This work resulted in such a way that it has been possible to proceed to a certain extent with our experiments on the tuberculous infection. The results attained are presented in a second part.

As previously recorded splenectomized mice when fed with fresh sheep or mouse spleen frequently show signs of illness. Some animals die within a few hours after eating the organ and of those that die some show hemorrhages into the peritoneal serosa or peritoneal cavity. The mice that have been ill are apt to refuse to eat the fresh organ on several succeeding days. When they do eat again they may or may not show signs of illness once more. Splenectomized mice fed with fresh sheep muscle never showed any sign of acute illness. Intact mice fed with spleen also showed no sign of ill effect.

These experiments were made on animals from 2 weeks to 4 weeks after the removal of the spleen. The intoxicating effect was readily noticeable in animals infected with the tubercle bacillus. In the non-infected animals the result was definite on the whole but was sufficiently irregular to make it seem impracticable to do systematic work which should include a consideration of the negative results.

Passing by the steps which led to a definite method of work we may say we found that at 4 or 5 days after splenectomy the intoxication is more regular in its occurrence and is apt to be more severe than at later periods. Also,

* From the Henry Phipps Institute of the University of Pennsylvania.

as we continued these observations, we became impressed with the fact that the hemorrhagic serositis especially of the peritoneum, which we had occasionally noticed, was really an integral part of the process. Following a natural train of thought from this point we were led to test the coagulation time of the blood. We have found that the most constant result following the feeding of spleen to splenectomized mice is a delayed coagulation time. With these facts as a basis for judgment we have studied the nature of this intoxication as it relates to the time of its possible development after splenectomy, the rate of its development after feeding, its specificity both as to organ and as to species, the amount of fresh substance necessary to produce the intoxication and finally the effect of the continuous feeding of less than the fatal amount of substance.

The general methods of splenectomy and feeding have been stated in our previous papers. With regard to the feeding we may repeat that the animals are fed with the fresh organs before other food is given on that day. We have found that the change in coagulation time is apt to be somewhat more pronounced after the second day's feeding than on the first day. Therefore in case the first feeding has given a negative result we have always fed with the same substance on the next day. The coagulation time has been taken with the Bogg's instrument, the blood being drawn from the tail. In the following experiments the first feeding was on the fourth day after splenectomy. The second feeding was on the following day. The coagulation time was taken before feeding and usually from 3 to 4 hours after feeding.

The results of these experiments may be summarized as follows:

Splenectomized mice fed on the fourth day and again on the fifth day show no change in the coagulation time of the blood when the following organs are used:

Lymph nodes, thymus gland, liver, kidney, skeletal muscle, lung, brain, pancreas, pituitary gland, testicle, adrenal, thyroid gland, salivary glands, and the mucosa of the large intestines.

When fed with the following tissues the mice show a delay in the coagulation time varying between 2minutes and 15 minutes:

Spleen of mouse, rat, guinea pig, rabbit, beef, sheep, cat, and human being. Gastric mucosa of mouse, and cat, mucosa of the upper small intestines of mouse and cat.

The mice which show the smaller changes in coagulation time seldom show any other evidence of the intoxication. When the delay in coagulation time is marked the animals are apt to be extremely sick, and a considerable number of the animals have died. Death when it occurs usually takes place before the eighth hour. In twenty hours the blood of the surviving animals has usually returned to the normal. Occasionally animals are encountered in which the return to normal is less rapid. In these instances the blood coagulates slowly and the animal is still sick at the end of 24 hours. These animals sometimes recover and sometimes die. The animals which die during the course of this intoxication reveal various changes at post mortem examination. In some no gross changes can be made out. In others there are found petechial hemorrhages of the serous membranes, particularly the visceral peritoneum. Some instances of hemorrhage into the intestine have been encountered. The most usual result is a diffuse rather poorly marked reddening of the peritoneal

serosa accompanied by a small amount of blood tinged peritoneal fluid. Occasionally extremely large hemorrhages into the peritoneal cavity have occurred. When this has happened the animal has died quite suddenly. No definite bleeding point has been discovered in any instance.

We have been unable to distinguish in any way between the intoxications resulting from feeding spleen and the consequence of feeding gastro-intestinal mucosa.

If these animals which recover from this intoxication are fed repeatedly a certain number of them will die at the later feedings. The remainder after ten days or two weeks no longer develop the evidence of illness even though they may eat large quantities of material. They do not become sick and the coagulation time of the blood remains normal. This acquired tolerance is developed to either the spleen or to the gastro-intestinal mucosa. We have some evidence that tolerance to spleen is not accompanied by tolerance to gastro-intestinal mucosa or vice-versa. We hope to develop this phase of the subject in more detail later.

Returning now to the bearings of the facts just presented on the tuberculosis problem which are the second part fo this paper we have one important experiment which we wish to report at this time as follows:

A considerable number of mice were splenectomized. Part of them were fed with spleen repeatedly until all of the survivors were entirely tolerant to it. Another part were treated in the same way with gastro-intestinal mucosa.

When tolerance was established these mice were inoculated intra-peritoneally with 1 mg. of a bovine type of tubercle bacillus. At the same time two other series of mice were inoculated with the same dose of the same culture. One of these series were entirely normal mice. The other series were mice that had been splenectomized at the same time as those fed with organs. The series rendered tolerant to spleen were fed with the spleen throughout the course of their infection. Those fed with gastro-intestinal mucosa were likewise fed with this tissue after infection.

The experiment resulted in the following way.

The normal intact animals were all dead in forty-two days.

The splenectomized mice not fed with organs began to die at forty days, several of them living more than sixty days.

The splenectomized mice fed with spleen were nearly all dead in forty days.

The splenectomized mice fed with the gastro-intestinal mucus membrane nearly all lived over sixty days.

Expressed in terms of our earlier work the results of this experiment are:

First, The resistance which is given to mice by the removal of the spleen is abolished by continuously feeding spleen. It is not affected by feeding gastro-intestinal mucosa.

We conclude therefore that when we remove the spleen we remove some bodily function which makes for susceptibility to infection with the tubercle bacillus. This function can be restored by feeding fresh spleen continuously throughout the course of the infection.

1. Lewis P. A. and Margot, A. G.: Jour. Exp. Med., 1914, xix, 187.
2. Lewis, P. A. and Margot, A. G.: Jour. Exp. Med., 1915, xxi, 84.

FURTHER OBSERVATIONS ON THE PRESENCE OF IODINE IN TUBERCULOSIS TISSUES *

By Paul A. Lewis, M.D., and Robert B. Krauss

Philadelphia

In a paper presented before this section two years ago we gave the results of some analyses which showed that the tuberculous tissue of rabbits might contain appreciable amounts of iodine, even though iodine products had not been administered to the animals. These analyses were extended somewhat and published in a paper in the *Journal of Biological Chemistry*, Vol. xviii, No. 2, July, 1914.

The points made in that paper may be repeated here by quoting the summary there given, as follows:

"Tuberculous tissue derived from animals to which no iodine preparation has been knowingly administered may contain amounts of iodine very appreciably higher than normal tissue of the same animal. While it is quite probable that tuberculous tissue in animals treated with iodine products may store up iodine, this has been by no means clearly shown in any experiments so far reported. The highest figures for the tuberculous tissue of untreated animals in our experience may equal the highest figures of those reported by others as evidence for the localization in the tissue of iodine intentionally administered."

The analyses on which this first paper were based were done by the Kendall method. It was understood by us that this method was scarcely adequate to give perfectly convincing results with the small amounts of tissue available for study. Objections reached us from some who believed that the method was entirely inadequate and that consequently it was unlikely that our results represented the true situation.

Accordingly one of us (Krauss) has devoted considerable effort during the past winter to the development of more accurate and sensitive methods for the examination of tissues for iodine. This study has been entirely successful and a method is now available which is competent to detect with certainty and measure with accuracy the merest traces of iodine.

As in the older methods the dried tissue is subjected to a process of incineration to convert the iodine into an inorganic form. Palladium chloride is added to the fusion mass and in the presence of iodine develops palladium iodide which gives a characteristic color reaction. The intensity of the color developed is determined by colorimetry in comparison with standard solutions. The details of this method and the checks used to determine its limitations and its accuracy will shortly be published.

* From the Henry Phipps Institute of the University of Pennsylvania.

Using this method for the examination of the tissues for iodine we have re-examined the points at issue. Our work has been conducted as follows. Rabbits are inoculated on the cornea of one eye with a virulent culture of the tubercle bacillus of bovine type. This gives a rapidly progressing infection the characteristics of which we have previously described in detail. At suitable intervals the animals are killed. The corneae are dissected free from the remainder of the eyes. The tissues are separately dried and analyzed for iodine. We have in this way for analysis, first, the tuberculous cornea, second, the normal cornea of the same animal; third, the remainder of both eyes and fourth, any other normal tissue from the animal which it may be useful to examine. The thyroid gland has been included in this series in most instances. If the animals are allowed to live long enough of course the disease becomes generalized and tuberculous tissues from other parts of the body may also be examined.

The results of these experiments may be briefly summarized as follows:

The normal cornea frequently contains traces of iodine. The tuberculous cornea of these animals always contain a much higher percentage of iodine than the normal cornea. When in any animal the normal cornea contains no iodine the diseased cornea also is negative as far as our experience goes. The remainder of the normal tissue of the eye usually contains no iodine. The amount of iodine in the normal cornea or in the diseased cornea bears no relation whatever to the amount of iodine in the thyroid gland.

It was conceivable that the corneal disease might present a very special case. We have therefore examined the tuberculous lymph nodes of rabbits and guinea pigs and have found that they frequently contain iodine in amounts comparable to those in the corneal lesion.

We conclude from this work that iodine is frequently present in tuberculous tissue independently of any intentional administration of iodine containing substances. The quantities found are such as to render without force the conclusion of previous observers that the tuberculous tissue has an especial affinity for iodine when intentionally administered. This may still, of course, be the case but the evidence for it is insufficient. We have no evidence bearing on the nature of the iodine compounds in the tuberculous tissue or the source from which they are derived. The iodine is however independent of thyroid iodine in its quantitative relationships.

THE BACTERAEMIC NATURE OF LEPROSY AND TUBERCULOSIS*

By D. Rivas, M.D.

Philadelphia

The term bacteraemia is sometimes used to indicate simply the presence of bacteria in the blood. In a more strict sense, however, it should not imply the temporary or occasional presence of bacteria in the circulation, but more especially the habitation of the infective organisms in the blood stream, by habitation being understood the property some bacteria have for living and multiplying in the circulating blood.

A good example of bacteraemia is afforded by *B. anthracis*. This bacterial infection begins usually as a localized lesion of the skin or mucous membrane from which, under certain conditions, it may invade the blood. Once in the blood the bacterium has the power of multiplying to such numbers that not uncommonly it causes death by mechanical action due to the plugging of small capillaries in the brain and other vital organs.

Another example is offered by typhoid bacillus. The lesion begins in the Peyer's patch of the intestine from which the bacillus passes to the circulation. That these two infections, anthrax and typhoid fever, may be taken as a type of bacteraemia is easily proven by the fact that without any difficulty the organisms can be recovered in cultures made from the blood of persons suffering with these diseases.

Contrary to these we can find for comparison two other diseases which as far as we know are purely local, namely, diphtheria, a disease which affects the mucous membrane, and tetanus, which does not penetrate beyond the subcutaneous tissue. The organisms responsible for these diseases, namely, diphtheria bacillus and tetanus bacillus respectively, cannot be recovered in cultures made from the blood of the patient.

There are other micro-organisms, such as streptococcus, staphylococcus, and a variety of other pyogenic bacteria which commonly produced localized lesions, but under certain conditions they may also invade the blood.

In the case of tuberculosis which is a disease of the lymphatic system, the tubercle bacillus commonly gains entrance to the organism through the lymphoid tissues of the intestine or the respiratory tract. In this locality it usually produces first a local lesion of the lymph nodes of the intestines or lungs as the case may be, but in time it may give rise to changes, such as degeneration, caseation, and softening, producing not uncommonly extensive destruction of the surrounding tissue. Under such conditions the tubercle bacillus may escape, gain entrance into the blood, and being carried by the circulation

*From the Laboratory of Tropical Medicine and Comparative Pathology, University of Pennsylvania.

to distant parts from the original focus, may give rise to secondary lesions either in the form of miliary tuberculosis or as localized tubercles, as the case may be.

Tubercle bacilli, therefore, unquestionably enter the circulation when the character of the lesion is such as to produce marked destructive changes in the part, but can this be called a bacteraemia? In the writer's opinion we are not as yet justified to call it such, because it would be necessary first to show that the tubercle bacillus on entering the circulation is capable of living and multiplying in the blood from which it can be recovered in culture as is usually the case in those bacteraemic diseases such as anthrax, typhoid, etc., as above stated, or that tuberculosis can be produced by the injection of the blood of tuberculous patients into susceptible animals during the course of the disease.

Looking over the literature we find the statement of quite a number of investigators to the effect that they have been able to recover the tubercle bacillus from the patient's blood either in culture or they have been able to transmit the disease to the laboratory animals when a certain amount of blood from tuberculous patient was inoculated. Contrary to this we find other investigators who have been unable to corroborate these findings. In our experiments made along this line, the blood of patients suffering with tuberculosis in the first, second, and third stages was cultured in appropriate media, and also inoculated into rabbits and guinea pigs with entirely negative results. Ten patients were selected for the work and from 25 to 30 cc. of blood collected in citrate solution. The blood from each patient was inoculated into two guinea pigs in the amount of about 5 to 8 cc. for each animal, intraperitoneally and about 10 cc. of the same blood was inoculated into a rabbit, also intraperitoneally. There were in all twenty guinea pigs and ten rabbits inoculated. The animals were subjected to a careful observation for six months. During this time some died in a few weeks after inoculation, others after two or three months and the remaining ones, which were more than half the original number, were sacrificed after six months. At the autopsies no lesions of tuberculosis were found.

The statement has also come to our attention that the disease may be transmitted to guinea pigs when the blood is collected from the patient at the very end of the disease, a few days before death or at the autopsies. In such cases not uncommonly positive results have been obtained, but is this an evidence of the bacteraemic nature of tuberculosis? For myself I am inclined to believe that the tubercle bacillus may invade the blood in the very last stages of the disease, but it is a question whether the organisms live and multiply in the circulating blood. The well known fact that tuberculosis is a disease of the lymphatics and that the lesion is always circumscribed and usually encapsulated in the early stages is a proof, I believe, that this disease has no tendency to become generalized except at the very end when the resistance of the body has been entirely overcome.

There are two ways in which a bacterium can be detected in the blood. One is by the successful cultivation of the organism in question and the other by the successful transmission of the disease when a certain amount of the

blood is inoculated into susceptible animals. A third procedure in the diagnosis consists in the finding of the micro-organism by the microscopical examination of the blood. In our experience these methods have given negative results except in very advanced cases of tuberculosis shortly before death and in those cases in which a sample of blood was taken at the autopsy.

As to the nature of leprosy, the disease, as a rule, is a generalized infection, but it is a question as yet whether the disease begins first in the internal organs and is manifested later in the skin or whether the disease begins primarily in the skin. We know, however, that the clinical diagnosis of leprosy is based generally on the skin lesions. In the laboratory diagnosis of the disease we have three means to consider, namely, the cultivation of lepra bacillus in cultures, the transmission of the disease to the lower animals, and the microscopical examination of the blood.

The cultivation of the micro-organism from the blood is generally accepted to be unsuccessful. In our experience such has been the case. The transmission of the disease by inoculating susceptible animals with the blood from cases of leprosy likewise has given negative results. *As to the finding of the micro-organism in the blood, however, this in our experience has been quite successful.**

It must be recognized however, that the mere finding of acid fast organisms in the material does not necessarily imply that the organisms are either tubercle or lepra bacilli, except when they are in large numbers and more especially if they happen to have a characteristic appearance and arrangement by means of which they can be easily recognized. In leprosy this question is simplified as in this disease the "lepra cells" are pathognomonic. By "lepra cells" is meant the presence of acid-fast organisms inside the endothelial cells or lymphocytes in which the bacillus is usually found in very large numbers. In our work these lepra cells were constantly found in the blood taken directly from the tip of the finger or the vein of the fore-arm. Briefly stated, the method is very simple. It merely consists in collecting a few drops of blood from the finger or vein in about 5 cc. of a 2 per cent acetic acid solution. This is centrifugalized and the sediment examined for the presence of acid fast organisms by the method usually recommended for the diagnosis of tubercle bacilli. In cases of leprosy of course especial attention should be given to the finding of "lepra cells" in the material. The application of this method for the detection of tubercle bacilli in the blood has given negative results.

Another evidence of the bacteraemic nature of a disease is found in the character of the lesions, with especial reference to their distribution on the surface of the body, and the internal organs. It is well known that typhoid fever produces eruptions on both sides of the abdomen, that the petechial hemorrhages of septicemia are manifested on both sides of the body, and that the eruption of most infectious fevers are as a rule symmetrical. The cause of some infectious fevers is not known, but the symmetry of the lesions, never-

* *New Orleans Medical and Surg. Journal*, 1912, vol. 65.

theless, points to the fact that the virus is in the blood, otherwise such a bilateral distribution would not be shown, and if leprosy should be classified under the bacteraemic diseases it should follow the same rule by producing symmetrical lesions. A glance at the face of a lepra patient clearly convinces the clinician of the remarkable symmetry of the lesions and these are bilateral not only on the face but on the arms, trunk and legs. The writer has this investigation under consideration and expects to illustrate these facts with photographs of a number of patients in the near future.

With regard to tuberculosis there is a remarkable contrast as compared with leprosy in that the disease is localized and unilateral as a rule. It is not uncommon to see one chain of cervical lymph nodes affected in order, while the other side is free; likewise one lung may be affected while the other remains normal. The same is true in cases of tuberculosis of the hip joint, the knee, and of any other tuberculous lesion of the body. It may affect both sides of the body sometimes but that is the exception. If the disease is a bacteraemic infection, the writer does not find any explanation why the lesions are not bilateral as in the case with leprosy and likewise the same is true in all other bacteremic infections and infectious diseases.

CONCLUSIONS

From the above the following conclusions are drawn:

1. That tuberculosis is not a bacteraemic infection.

a. Because of the fact that tubercle bacilli cannot be cultured directly from the blood.

b. Because of the fact that injection of the patient's blood into a guinea pig as a rule does not produce tuberculous lesions except when the blood is taken at the autopsy or at the very end of the disease when open lesions are manifested and the resistance of the body has been overcome.

c. The disease is usually unilateral and does not therefore follow the normal channels of other bacteraemic diseases in which the organisms are carried by the blood and symmetrical distribution of lesions is the rule.

2. That leprosy is a bacteraemic infection.

a. Because lepra bacilli can be easily detected in the blood during the course of the disease.

b. The lesions are symmetrical, that is they correspond to the lesions produced in other bacteraemic infections.

THE VALUE OF COPPER IN THE TREATMENT OF TUBERCULOSIS

By Lydia M. DeWitt, M.D.

Chicago, Ill.

Tuberculosis is a disease of so irregular a course, of so chronic a character, with so great a tendency to periods of latency, alternating with periods of acute exacerbation, even with so marked an inclination to healing or at least walling off of the tuberculous tissue, that it forms a particularly tempting and favorable field for the exploitation of new therapeutic ideas and for the testing of new remedies. Treatment of any kind begun a short time before the favorable turn of the disease seems to have caused the apparent improvement, while another, equally good, instituted just before the period of exacerbation is condemned as useless and even injurious.

This curious character of the disease makes it a favorite and yet a discouraging field for investigative activity. Thus Koch's tuberculin was hailed with enthusiasm as the specific cure for the infection, until it was found that whatever claims might be made for its palliative and diagnostic value, it could not be relied upon to cure the disease. The modifications and varieties of tuberculin vaccine which have been on the market and widely advertised are too well known and their failures too recent to need even a passing mention. Some have no doubt been the invention of quacks and charlatans too eager for the dollar to care for the anguish of the sufferer who is buoyed up by the mirage of each fresh but false hope, only to sink still deeper into the slough of despondency and discouragement. Many are no doubt the honest though mistaken judgments of earnest, enthusiastic workers, who are themselves deceived by the apparent improvement following the use of so many new methods of treatment.

At the present time the investigators on the tuberculosis problem, discouraged and disgusted by the failure of so many attempts to find a serum or vaccine specific therapy and stimulated by the example of Ehrlich and his coworkers, have almost with one accord turned to the field of chemotherapy with the hope that in the tremendous number of chemical compounds and the infinite variety of possible combinations of these, one might be found which should have a favorable and specific action on tuberculosis. Among the chemicals which seemed to offer some hope was copper. Long recognized as a valuable germicide and fungicide, long known to possess a low degree of toxicity for the higher animal organism, long used for the destruction of certain pathogenic fungi on plants and for the purification of water contaminated by fungi and bacteria, it is small wonder that it should seem desirable to test its efficacy in therapeutics. It already has a high reputed value in the treatment of dis-

eases due to higher fungi—such as oidimycosis, actinomycosis and sporotrichosis, in which it seems to have some degree of efficacy. In 1894 Luton published a monograph suggesting the therapeutic use of copper in tuberculosis but nothing further appeared on the subject until 1912 when a number of papers were published describing surprisingly favorable results from the use of various compounds of copper both in experimental tuberculosis in guinea pigs and in the treatment of external and of pulmonary tuberculosis in men. This work was reported before the International Congress held at Rome in 1912 and, like all new remedies for tuberculosis, excited much attention. The experimental work was begun by Professor Finkler and was carried on for some time under his direction. After his death the experiments were continued by Countess Maria von Linden and reported by her under the caption the *Finkler Heilverfahren für Tuberculose*. Numerous copper salts were tested, among them the sulphate, chloride, tartrate, and finally and the one from which she claimed to obtain the best results was a complex copper lecithin compound used either alone or combined with iod-methylene blue. The last named preparation was made and put on the market under the name Lecutyl by the Bayer dye-works. The culture used by Countess von Linden was of relatively low virulence. The treatment was begun 2–3 weeks after infection and caused healing of the initial sinus, lowering of fever, stopping of destructive process and healing of tubercles in organs. In two animals at least, cure was so complete that inoculation of their organs into other animals failed to confer the disease. In brief her claims were that copper lengthened life, relieved symptoms, intensified fibroid and other healing tendencies in the animal, while in the test tube a concentration of 1 in 2,000,000 was sufficient to inhibit the growth of the organisms and 1 in 100,000 killed all organisms so that they failed to grow when inoculated on fresh media. 0.4 mgm. of copper in the form of copper chloride killed 1 mgm. of tubercle bacilli so that guinea pigs inoculated with them failed to develop the disease. She claimed considerable specificity of copper for tuberculosis, since both tubercle bacilli and tuberculous tissues placed in very dilute solutions of copper salts absorbed the copper and were stained by it, tearing it, as she says, from its solution, while other tissues and organisms remained unstained. Her results attracted the more attention because her report was accompanied by reports from two clinical men, Meissen, who treated a number of pulmonary cases with copper salts with good results in light and moderately severe cases and no injurious action, and Strauss who treated 70 or more skin cases with Bayer's copper and methylene blue mostly in salve form with very favorable results. These reports were encouraging enough to cause renewed investigation both in experimental tuberculosis in animals and in human patients. Certain of the reports confirmed the v. Linden claims and others contradicted them. Selter stated that he had worked with Finkler but was unable to get conclusive results with the remedy. Feldt thought that copper had less bactericidal influence than was claimed for it and far less than gold. Eggers obtained good results in external tuberculosis but none unquestionably favorable in the pulmonary cases. Moewes and Jauer used organic copper preparations for injection, salve for inunction (which they soon stopped as it was too irritating)

and capsules (but they found these difficult to swallow and irritating to the stomach). Their tuberculous guinea pigs lived no longer if as long when treated with copper as when untreated; they developed generalized tuberculosis to the same extent and showed no copper in the tuberculous organs. There was no difference between treated and untreated animals in the course of the disease, in the length of life or in the pathologic findings. In human patients, the reaction was very severe, but no permanent influence was noted and no benefit which could be definitely ascribed to the copper. Kaiser used the remedies as recommended in 23 of a series of 40 infected guinea pigs and states that in no animal did he note any favorable influence on the course of the disease. Large doses, such as were recommended by v. Linden killed the animals at once and even small doses shortened life materially. He also treated patients, but saw no improvement that could be ascribed to the remedy. One advanced case received 10 injections, took the capsules for 3 months and had 4 inunctions, but grew steadily worse and died of generalized tuberculosis. One patient with lupus was treated with the salve externally and capsules internally; a severe dermatitis developed with much loss of normal tissue but none of lupus tissue.

Over a year before the appearance of the first of this series of German reports we in our laboratory, tempted by the generally good reputation of copper as a germicide and fungicide, by its use in diseases caused by higher fungi and by its relatively low toxicity, had begun a long series of experiments on the relation of copper to tuberculosis. Believing that a chemical agent of this kind to be effective must be readily absorbed by the tuberculous tissue and also by the tubercle bacilli and must kill these bacilli in a dilution such as can be secured in the animal body without injury, we tested the tuberculocidal action of copper solutions, the distribution of the copper in the tuberculous animal and the effect of a tolerated dosage on the progress of the disease. Much of this work was done and has been reported by Dr. Corper, then working in our laboratory, and the rest by myself assisted by Miss Hope Sherman. We used copper sulphate, copper chloride, copper acetate, copper oleate, copper amino acids, and copper salts of trypan blue. These were administered by feeding, by inunction, and by intramuscular or subcutaneous injection. Colloidal copper was also given intravenously. Guinea pigs were infected with virulent human tubercle bacilli subcutaneously and rabbits by inoculation in the anterior chamber of the eye. Treatment was begun in some cases from 2 to 19 days before infection to test the prophylactic action of copper and in other cases it was begun from 11 to 14 days or even longer after the infection. Controls were in every case inoculated at the same time and with the same amount of the same culture of tubercle bacilli. In *no* case was *any* effect observed on the progress of the disease. In *no* case was *any* appreciable amount of copper found in tuberculous glands, pus, or eye, although considerable quantities were found in the liver and some in kidneys, spleen, and lungs of normal as well as of tuberculous animals and even in animals receiving no copper treatment, traces were usually found in the liver. We also found that cultures of tubercle bacilli in thin filtered suspension could be exposed for 7 days to 1 per cent copper chloride without de-

stroying their power to infect guinea pigs, though the organisms when dried in a thin layer on glass beads were killed in 24 hours by 5 per cent solutions of either copper sulphate or copper chloride, so that they failed to develop when injected into susceptible animals. If, however, the culture were in the form of small clumps, it could be exposed for 48 hours to 10 per cent. or even saturated solutions of the copper salts and yet grow luxuriantly when planted on artificial media. This is no doubt due to the fact that copper salts do not penetrate well into the clumps and hence only the organisms on the outer layer are killed. The inhibitory power is much greater. If copper chloride or copper sulphate is added to glycerine agar and precipitation prevented, and the copper media inoculated with human tubercle bacilli, no growth develops on dilutions of 1–1000, 1–10,000, or 1–100,000, while there is luxuriant growth on tubes containing one part of copper to one million parts of agar. 1–1,000,000 then does not inhibit, far less 1–2,000,000 as stated by v. Linden. The inhibited cultures are eventually killed or at least have lost their power to develop when transplanted after some weeks on fresh media. Our copper preparations are by no means non-toxic. 0.05 to 0.1 mgm. copper introduced intraperitoneally kills a 10 gram mouse. The local reaction after subcutaneous or intracutaneous injections is severe, even 1–100,000 solutions causing induration, while anything stronger than 1–10,000 causes severe necrosis and ulceration. If, then the entire body or the blood and fluids circulating through the body could be made to carry constantly 1 part of copper to 100,000 parts of body weight, we might thus inhibit the growth of the organism and eventually kill it. This, however, seems to be impossible. The soluble copper salts seem to be changed to a colloidal form and either held at point of injection, causing necrosis, or taken up by the phagocytic cells of liver and spleen and held by them. A mere trace is ever found in the blood even of animals saturated almost to the lethal point with copper.

Our results then fail in every particular to confirm those of v. Linden and her co-workers. She found copper relatively nontoxic, highly tuberculocidal in the test tube, prophylactic and curative in both human and animal organisms, whether given by mouth, by inunction or by injection, specific in the sense that tubercle bacilli and tuberculous tissues take up copper from solutions much more than do other organisms and tissues. We have found (1) that tubercle bacilli require 5 per cent. solutions to kill in 24 hours even under the most favorable conditions, while if the organisms are clumped or covered with organic or protein material it is impossible to kill them even by saturated solutions. Colon and typhoid organisms, on the other hand, are readily killed in 24 hours by dilutions of 1 part of copper in 1,000,000 parts of water and in 48 hours by 1 part of copper in 10,000,000 parts of water; (2) that tuberculous tissues, so far from having a specific attraction for copper, fail to show any appreciable trace of copper, even when the animal is saturated to the lethal point with any one of the preparations used by us; (3) that copper in any of the compounds used has no effect on the progress of the disease. Treated animals die as early or earlier than the untreated and the disease is fully as generalized and advanced as in the untreated controls in the same

stage. Necrosis and caseation are as a rule more pronounced than the fibroid processes found by v. Linden.

We ourselves have not used the copper salts on human patients but a letter from Dr. Mills, formerly in our laboratory and now working in Korea, states that all families in Korea, from the richest to the poorest use brass dishes and spoons from earliest infancy to old age, except during the summer months, when the food spoils too readily in the brass dishes; even then the brass spoons are used. They think these dishes protect them from epidemic fevers. Here then is a race of 13,000,000 people trying the copper experiment during the whole of their life span. He states that he finds tuberculosis in abundance in his autopsies and that many deaths resulted from tuberculosis of intestines, peritoneum, or lungs, ending in miliary tuberculosis. Evidently, he writes, "under these conditions at least, copper fails to protect or cure."

In conclusion, we may say then that, so far as our experience goes copper has NO value in the fight against tuberculosis; that its use is unjustifiable and may even prove dangerous since we have found that concentrations below the strength required for killing organisms frequently stimulate their growth.

ON NEW METHODS OF SERUM DIAGNOSIS OF TUBERCULOSIS*

By J. Bronfenbrenner and M. J. Schlesinger

Pittsburgh

Although in the experiments of Weinland[1] the parenteral introduction of cane sugar was apparently followed by the appearance in the blood of experimental animals of a specific ferment of the nature of Invertin, there is not enough evidence to show that the same is the case in the experiments of Abderhalden, Pincussohn,[2] Weichardt,[3] Schittenhelm,[4] Gruber,[5] and others, who think they have produced specific proteolytic ferments by the introduction of different substances of protein nature, in addition to whatever antibodies might have been produced by this treatment of animals.

According to these authors, the parenteral introduction of placenta protein into the experimental animal results in its producing a specific ferment, which appears in the blood of the animal in sufficient concentration to be able to digest in vitro coagulated placenta protein. This same proteolytic ferment is assumed to be present in the circulating blood of pregnant individuals through the whole period of pregnancy in sufficient concentration so that a method of diagnosis of pregnancy can be based upon allowing this ferment if present to digest directly the coagulated placenta protein in vitro.

This digestion is evidenced by the appearance of cleavage of protein. Abderhalden utilized both the property of these cleavage substances to change the plane of polarized light, as well as their ability to dialyze through porous membranes, as the basis of the method by means of which the presence of these ferments in the serum can be detected. The observation that the animal organism is endowed with the ability to respond to the direct or indirect introduction in its blood circulation of certain foreign elements, by the production of specific immunizing or protective substances is not new. Ehrlich was the first to formulate the laws governing this mechanism, as based on the processes of cellular nutrition. The main difference between his conception of the phenomena of specific protection and that of Abderhalden is in the properties ascribed to the specific protective substances by the respective authors. Whereas according to Ehrlich the protective substances though responsible for the specificity of the process are not active by themselves, according to Abderhalden they are endowed with fermentative properties in addition to those of specific selection. The presence in the blood of animals of such specific ferments, not existing there normally, should according to this theory indicate that the parenteral digestion of foreign substances is taking place in the body. Thus, the method proposed by Abderhalden originally

* From the Laboratories of the Western Pennsylvania Hospital, Pittsburgh, Pa.

for diagnosis of pregnancy, was used by a number of authors in different conditions, when the invasion of organisms by foreign substances was suspected. Amongst a number of other conditions, the application of this method was also very extensively attempted in tuberculosis. Beginning with Abderhalden and Andryewsky,[6] a number of authors including Lampe,[7] Yessen,[8] Gumpertz,[9] Frankel,[10] Ammenhauser[11] and others found the method to be quite specific. On the other hand, Wolff and Frank,[12] Krym,[13] Gwerder and Melikjanz,[14] Keufer,[15] and many others found the method absolutely nonspecific. Krym for instance found that 80 per cent. of normal controls gave positive reactions with tuberculous lung as substratum, whereas a number of his tuberculous patients reacted with placenta as substratum. Similar results were obtained by a number of other investigators. How could the results just reported be explained if it is assumed with Abderhalden that the substratum is digested in these experiments, and if the ferments, responsible for digestion are not present in the blood of normal individuals?

It seems to be quite evident that the ferments, upon which depends the digestion in Abderhalden reaction, are present in normal as well as in pathological conditions and therefore are not specific. This absence of specificity in the proteolytic ferments is apparently quite general and not limited to tuberculosis alone. Indeed a number of authors deny it absolutely in pregnancy as well.* In view of apparent doubt on the part of many authors in the existence of specific ferments in general, we undertook the study of this question in this laboratory and came to the following conclusions.

The parenteral introduction of foreign protein is followed, as assumed by Ehrlich, by the production of specific antibodies only. There is no evidence whatever to show the existence of specific protective ferments.[16] We found that, the appearance of dialysable split products during the Abderhalden reaction is due to the activity of a nonspecific proteolytic ferment constantly present in the blood of all the animals. We found moreover, that although such normal proteolytic ferment if set free may digest any natural protein[17] in virtue of its tryptic properties, it is absolutely unable, in the concentration in which it is present in the blood, to digest coagulated (denatured) protein. We have demonstrated also that the dialysable split products originate from the serum of the patient as a result of its autodigestion.[18]

As to the mechanism of this autodigestion of the serum, the following explanation can be evolved from the experiments.[19] Proteolytic ferments, present in every fresh serum, are normally inhibited by some antitryptic constituents of the blood. The removal of these sets free the normal trypsin of the blood which in turn digests some part of the serum itself. Such removal of the antitrypsin may be accomplished in vitro by two apparently independent processes; one non-specific—a simple adsorption and filtering out of the inhibiting substance—which would explain the results of Plaut,[24] Peiper,[25] Kjaergaard,[26] Flatow,[27] etc.; the other, an apparently specific process, in which the falling out or inactivation of the inhibiting substances appears to be the result of the change of the colloidal conditions of the media, resulting from

* Michaelis and v. Lagermark, Oeller and Stephan, Flatow, Lange.

the specific combination of the antigen of the substratum with the antibody of the patient's serum.*

In view of these findings it is possible to explain the results of Krym, Keufer, Wolff and Frank, and others, who found that dialysable substances appear equally as a result of combination of tuberculosis or normal serum with tuberculous or normal lung tissue.

If taken in excess, the lung tissue acts as a mechanical adsorbent of antitrypsin and thus causes the autodigestion of the serum.

In our own attempts to use the Abderhalden reaction for diagnosis of tuberculosis we used the dry B. E. as substratum. We found it more suitable than any other material first, because it is free from ninhydrin reacting substances, and also because one avoids the non-specific reaction connected with the use of tuberculous lung tissue due to the very small quantity ($\frac{1}{2}$ mgm.) necessary for the test.

However, as we see it, the reason for conflicting results in Abderhalden reaction is not only in the improper control of the quantity of the substratum. Since the test depends on the appearance of dialysable split products of protein, the fact that the blood of patients may contain an amount of amino acids sufficient to mask the specific reaction is another important factor. In such instances, where the serum alone contains dialyzable ninhydrin reactive substances the difference in the intensity of the reaction with ninhydrin in the control tube with serum alone, and in the tube containing substratum as well as serum, furnishes the basis for diagnosis,[28] but undoubtedly this may be a source of errors. A modification was offered therefore, by Schlipmert and Issel,[29] who remove this source of error by subjecting the serum of the patient to dialysis prior to application of the main test, using subsequently such serum deprived of its dialysable material for the digestion with placenta.

Our own study suggests another possible modification of the procedure of Abderhalden. We found earlier[19] that the interaction between the substratum and the specific serum at 0°C. is in general comparable to the interaction between antigen and antibody in other immunity reactions. Apart from the appearance of dialyzable substances, the substratum seems to undergo changes in the Adberhalden test, identical with those of erythrocytes when acted upon by hemolytic amboceptor; namely the substratum anchors the specific constituents of the immune serum, thus becoming "sensitized." Such a sensitized substratum was found to be able to induce autodigestion in any fresh normal serum.[30] It it thus apparent that Abderhalden reaction consists of two consecutive phases. In the first phase of the reaction the antigen of the substratum unites with the antibody of the specific serum, and in the second phase such a "sensitized substratum" adsorbs antitrypsin and sets serum to autodigestion. By preventing fresh serum from autodigestion immediately following the sensitization of the substratum (by performing the experiment at 0°C.) we actually separated the two phases.

* The experiments recently undertaken in our laboratory in collaboration with Dr. Fleisher, will show the actual changes in the degree of colloidal dispersion taking place during experiment.

Such a method would permit the examination of serum taken at any time no matter what the condition of the patient might be. The procedure is as follows:

After remaining over night in contact with suspected serum in the ice-box, substratum is centrifuged, washed with water to remove any serum which may adhere to it, and placed in a new thimble with any fresh serum that happens to be on hand. The best for this purpose is serum from a guinea-pig kept without food long enough (6 or 8 hours) to free its blood from dialyzable ninhydrin reacting substances.

We showed that control of the amount of substratum used in the test is most important, since the excess of substratum may cause a non-specific autodigestion of the serum.[19] We also showed that by performing the test in two phases, one can most efficiently counteract the complications arising in cases where the serum may contain free dialyzable substances. There are, however, other elements in the test which may lead to errors in the results.

Many authors have called the attention of the workers to the fact that it is most important to control the permeability of the thimbles. They have stated that even if the thimbles are proven to be suitable ones, they do not remain so long. Repeated boiling may render them impermeable for peptones and on the other hand, the slightest and invisible mechanical injury to the wall of the thimble, in manipulations preparatory to the test, render such thimbles permeable for the unchanged serum. Still another complication was found by the workers in the fact that the ninhydrin reaction as such is very delicate, and not only such factors as the alkalinity of the glassware, but even length and intensity of boiling the ninhydrin solution with the dialysate greatly influence the final reading. As a result of these findings numerous attempts were made by different workers to obviate the use of both thimbles and ninhydrin in the test.

Sometime ago one of us had described a method of diagnosing tuberculosis by means of a serum—skin test,[31] which also obviates the use of thimbles or ninhydrin in serum diagnosis.

The method consists in injecting into the skin of normal guinea-pigs of 0.05 c.c. of a suitable mixture of the patient's serum and tuberculin upon which, in positive cases, there results within the next 24 to 36 hours, at the site of the inoculation, a reaction similar in aspect to a tuberculin reaction. Each series of guinea-pigs is accompanied by a control guinea-pig receiving intradermically the double dose of tuberculin alone. In addition to this, as a control for the serum, each guinea-pig is injected, on the side opposite to that of the test injection, with double the amount of serum alone.

Although in our preliminary work on animals our results were very encouraging the application of the method to diagnosis of human tuberculosis gave irregular results as we stated at the time.[32]

As the formation of anaphylatoxin depends on the specific combination between antigen, antibody and complement, and as the amount of circulating antibody varies very markedly in different tuberculous individuals, at first we were inclined to think that the failure to obtain more regular results with human sera was due to this difference in antibody contents in different cases.

Our recent studies on the mechanism of the formation of anaphylatoxin[33] suggest however a more probable explanation of our failure to obtain uniform results with human material. As we have shown, the combination of antigen with its corresponding antibody results in autodigestion of the serum containing the antibody. The products of such autodigestion of the serum are, however, toxic only to the animals of the same species. Thus in the experiments reported above the anaphylatoxin produced as a result of autodigestion of human serum was not uniformly toxic to guinea-pigs. We, therefore, changed the method in the following manner.[34]

The serum of a suspected individual is injected intraperitoneally into a normal guinea-pig, thus transferring upon the guinea-pig the specific properties of the patient's serum. The subsequent combination between the serum of such a passively immunized pig* with the tuberculin leads to the autodigestion of guinea-pig serum and the formation of split products uniformly toxic to a normal guinea-pig. If injected into the skin, such toxic material produces a typical local reaction; if injected intravenously or intraperitoneally the guinea-pig dies with typical symptoms of anaphylaxis.

The specificity of this reaction has not been tested out in sufficient number of cases to judge of its merits as compared with the Abderhalden reaction. As both tests depend on the autodigestion of the serum, which takes place as a result of combination of antibody, with the substratum, one should expect the two reactions to give identical results. Due to the fact, however, that the readings in Abderhalden reaction may be influenced by imperfection of thimbles or by the delicacy of ninhydrin test, the anaphylatoxin test seems to offer a more reliable indicator for the specific autodigestion of the immune serum.

* If the human serum comes from a normal individual the injection into the guinea pig does not confer any specific properties on its serum, and, therefore, subsequent combination with substratum is not followed by autodigestion.

1. Weinland: Zeits. f. Biol., 1907, p. 279.
2. Abderhalden and Pincussohn: Zeit. f. phys. Chem., 1909, lxi, p. 200.
3. Abderhalden and Weichardt: ibid., 1909, lxii, p, 12.
4. Abderhalden and Schittenhelm: ibid., 1909, lx, p. 421.
5. Gruber: Zits. f. Immunitatf. u. exp. Ther., 1910, vii, p, 762.
6. Abderhalden and Andreyewski: Muench. med. Woch., 1913, p. 1641.
7. Lampe: Deut. med. Woch., 1913, p. 1774.
8. Lessen: Beitrag. z. Klin. d. Tuberc., 1913, xxvii, No. 3.
9. Gumpertz: ibid., 1914, xxx, No. 1.
10. Frankel: Muench. med. Woch., 1914, p. 727.
11. Ammenhauser: Muench. med. Woch., 1914, p. 2000.
12. Wolf and Frank: Muench. med. Woch., 1914, p. 1184.
13. Krym: ibid., p. 338.
14. Gwerder and Melikjanz: ibid., p. 980.
15. Keufer: ibid., p. 2215.
16. Bronfenbrenner: Proc. Soc. Exp. Biol. Med., 1914, p. 3–4.
17. Bronfenbrenner and Scott: ibid., 1915, p. 137–8.
18. Bronfenbrenner: Proc. Soc., Exp. Biol. Med., 1914, p. 7–8.
19. Bronfenbrenner: Jour. Exp. Med., 1915, xxi, p. 221.
20. Michaelis and Lagermark: Deut. med. Woch., 1914, Berl. kl. Woch., p. 363.
21. Oeller and Stephan: Muench. med. Woch., 1914, p. 12.
22. Flatow: ibid., p. 1160.
23. Lange: Berl. klin. Woch., 1914, p. 785.

24. Plaut: Muench. med. Woch., 1914, p. 238.
25. Peiper: Deut. med. Woch., 1914, p. 1151.
26. Kjerhaard: Zeit. f. Immunitatf., orig., 1914, xxii, p. 31.
27. Flatow: Muench. med. Woch., 1914, p. 468, 608, 1168.
28. Abderhalden: Abwehrfermente, 1914, 4th Ed., p. 257.
29. Schlimpert and Issel: Muench. med. Woch., 1913, p. 1758.
30. Bronfenbrenner, Mitchell and Schlesinger: Bioch. Bull., 1914, iii, p. 386.
31. Bronfenbrenner: Proc. Soc. Exp. Biol. Med., 1914, p. 90; and also, Science, 1914, p. 803.
32. Bronfenbrenner: this Journal, 1914.
33. Bronfenbrenner: Jour. Exp. Med., 1915, p. 480.
34. Bronfenbrenner: Proc. Soc. Exp. Biol. Med., 1914, vol. xii, p. 48.

A STUDY OF THE CULTIVATION OF THE TUBERCLE BACILLUS DIRECTLY FROM THE SPUTUM

By Robert A. Keilty, M.D.

Philadelphia

The purpose of this paper is to confirm the work of Petroff* in a recent paper on the cultivation of the tubercle bacillus and possibly to add a little from my own experience with the method.

Briefly as outlined by Petroff the sputum is mixed with a 3 per cent sodium hydroxide solution and incubated for a period of 30 minutes at 37°C. This is neutralized to sterile litmus paper with normal hydrochloric acid, centrifugalized and the sediment inoculated on a veal-egg medium to which gentian violet in the dilution of 1–10,000 has been added. The purpose of the sodium hydrate is to macerate the sputum and kill most of the organisms, while the gentian violet inhibits those not eliminated by the hydrate at the same time apparently beneficial to the tubercle bacillus.

From the standpoint of the general pathologist, having had variable results from antiformin, were this method available it seemed to me that many avenues were opened up for the study of this organism in pure culture and therefore it was tried out in a series of twenty-five known positive sputa. At the same time other media were used as a control concerning which I hope to report later.

Many tubes were planted from each case some with platinum loop and others by means of a sterile pipette. The latter is very satisfactory for inoculating a series of tubes rapidly with goodly amounts of material.

My results at first in the use of this method were discouraging, but as so often happens the fault or faults were mine and not the methods. Of the 25 cases from the last series of 7 planted on 21 tubes, I was able to get out 10 tubes of gentian violet egg-veal media with a pure culture of tubercle bacillus. Since my purpose was to test the method not so much for its rapidity as for its availability in isolating tubercle bacilli from generally contaminated material I think I may say that the method offers untold possibilities.

My failures may be grouped under three headings, drying, no growth and contamination. Drying of this medium in the incubator and even at room temperature is very marked so that to unused media kept only for a short time it may be necessary to add a few cubic centimeters of sterile water. In an addition to his reprint Petroff advises leaving the freshly inoculated tubes in the incubator for a few days until the moisture carried from the centrifuge tubes is absorbed and then paraffin the tubes. This has eliminated the question of drying. Secondly, no growth where known positive organisms existed. From my experience the reason for this probably rested in the neutralization of the sodium hydrate solution. As the neutral point is reached the liquid assumes a milky appearance. It would seem that it is

better to stop just here leaving the solution possibly a little alkaline in reaction. Thirdly, contamination is somewhat harder to explain. This usually resulted in liquefaction of the medium. My contaminations occurred mostly in tubes without gentian violet but some of the latter also suffered. Here aside from the question of technique, and some of my contaminations, e.g., subtilis and spores, were due to slips in technique, there still remains some organisms which this method will not eliminate. These contaminations in some instances were due in spite of care to the frequent daily examinations of many of the tubes. The temperature of the incubator is an important point for successful cultivation, somewhere between 37 and 38°C. should be the maximum of range.

As to the rapidity of growth I am not prepared to say, but at the end of 3 weeks incubation well marked colonies appear which will continue to grow at room temperature. These (Fig. 1) start as small pin points becoming multiple small raised grayish yellow points about 1 mm. in diameter at the end of 2 months. Where they become confluent they preserve their original colonies, growing upon one another.

Microscopically (Figs. 2 and 3) these cultures bear out the statement so often heard that the tubercle bacillus has no morphology. It is acid fast, resisting 30 per cent. hydrochloric for at least 30 seconds, no pleochromatic forms encountered. It occurred as rods, straight, curved, long, short, broad, thick and thin; cocci small, large, mostly single, occasionally like a streptococcus. Forms similar to the diphtheria bacillus only larger as dumb bells, clubbed, barred and granular. The beaded appearance of the original organism from the sputum is conspicuous by its absence. Branching forms were encountered and aside from the question of overlying a Y shape, was the most frequent. The predominating type is a slightly curved, short, moderately thin solid rod with denser granules at one or both ends.

CONCLUSIONS

1. It is possible to isolate the tubercle bacillus using scrupulous technique from contaminated material such as the sputum by the method outlined by Petroff probably in the majority of cases.
2. It is necessary to use several tubes.
3. The questions of neutralization, drying, temperature of incubator and contamination after the growth has started are important.
4. The colonies start as pin points becoming larger and confluent but still preserving individual groups of a dry appearance simulating the medium closely in color.
5. The bacillus of tuberculosis in young culture is tinctorily acid fast and of a polymorphous morphology.

McManes Laboratory of Pathology,
School of Medicine,
University of Pennsylvania.

REFERENCE

*"A New and Rapid Method for the Isolation and Cultivation of Tubercle Bacilli Directly from the Sputum and Feces," Journal Experimental Medicine, vol. xxi, No. 1, 1915.

THE WIDAL REACTION IN TUBERCULOUS PERSONS

By A. J. Chesley, M.D., and E. M. Wade, M.A.

Minneapolis

In reviewing the literature on this subject it is seen that a number of writers have found the Widal reaction to be present in tuberculous persons but have made no search for typhoid infection. Because evidence of tuberculosis was present either from clinical signs or from autopsy findings they have overlooked the possibility of a double infection or of chronic typhoid carriers whose serum usually retains the power of agglutinating typhoid bacilli.

Among such investigators are Jez,[1] Herman,[2] Caryophillis,[3] Armengaud,[4] Baetz and Bates,[5] and Ravenel.[6] Herman after finding 4 cases of tuberculosis showing the Widal reaction present in a dilution of 1:50 undertook some experiments on animals. Twelve rabbits were inoculated intravenously with a culture of human tubercle bacilli. After 2 months the blood serum in 11 of them agglutinated B. typhosus at 1:40 and in one at 1:50 dilution. At autopsy the 12 rabbits showed tuberculosis of the lungs and in one case also a small localized lesion in the liver. Four control rabbits showed agglutination positive in one, partial in one and negative in two. The blood serum of normal rabbits has such a variation in its ability to agglutinate B. typhosus that it seems hardly fair to draw the conclusion as Herman did, that pulmonary tuberculosis is a cause of error in the performance of the typhoid serum reaction.

In addition to these investigators who made no search for typhoid infection Jürgens,[7] Krencker[8] and Iversen[9] made very superficial examinations. Jürgens reported 2 cases agglutinating B. typhosus in a dilution of 1:50, in one of which symptoms resembled typhoid fever but evidence of typhoid infection was not found bacteriologically. Several weeks after recovery the patient had a return of the same symptoms but the diagnosis was at that time pulmonary tuberculosis in the early stage. No further search for typhoid infection is reported. In the other case the diagnosis was miliary tuberculosis but the feces showed the presence of the typhoid group organisms. At autopsy lesions of miliary tuberculosis were evident but no gross lesions of typhoid fever. No search for typhoid bacilli was made at autopsy and but for the previous bacteriological examination of the feces the typhoid infection would have been missed.

Krencker in 1909 made a study of 26 cases of tuberculosis for the Widal reaction and found 6 agglutinating B. typhosus in a dilution of 1:100, 2 agglutinating B. paratyphosus 1:100 and 4 agglutinating B. typhosus 1:50. In only 3 of the cases does he report any examinations for typhoid bacilli. In 1 case agglutinating B. typhosus 1:50 and B. paratyphosus 1:100 he obtained B. paratyphosus from the stool. From a second case which

agglutinated B. typhosus 1:200, a blood culture proved negative and from the third case agglutinating B. typhosus 1:200, cultures were made from the blood and feces and these proved negative. It is pointed out by Roth that Krencker did not examine sufficiently in detail for possible typhoid infection and that his percentage of Widal reactions is undoubtedly high owing to the fact that typhoid fever had been endemic in that locality for many years.

Roth[10] himself reported the results of the Widal test in a series of 100 cases of severe pulmonary tuberculosis. He found 5 cases that agglutinated in a dilution of 1:50 and no higher, but as he did not consider a dilution as low as 1:50 diagnostic of typhoid infection these cases were not studied further. In one case agglutination took place at 1:200. This patient gave no history of typhoid fever but had suffered from severe bowel catarrh. Roth made one examination of the discharges with negative findings. The patient left the city and so he could not follow the case further. He believed, however, that there was a mixed infection of tuberculosis and typhoid.

Passing over these writers, we come to a group of investigators, who, on finding the Widal reaction present, searched for typhoid infection and it is interesting to note that in every case where the search was made typhoid bacilli were found. As far back as 1897 Welch[11] pointed out that "infection with the typhoid bacillus," as indicated by a positive Widal reaction, "cannot be positively excluded on clinical grounds alone or by anatomic examinations at the postmortem table." In two cases cited by him and in Guinon and Meunier's[12] case reported the same year, as well as in those more recently reported by Busse[13] and Goebel,[14] B. typhosus was found at autopsy although the gross lesions were those of tuberculosis. In a case reported by Krehl,[15] B. typhosus was found present in the stool. Autopsy showed miliary tuberculosis but no gross lesions of typhoid fever.

Our own series of cases consists of 1017 persons, and covers a period of about 5 years. These cases are divided into two groups. Group I includes 496 persons whose sputum was examined in the routine work of the State Board of Health Laboratory and found to contain tubercle bacilli. Specimens of blood were obtained through the physician in attendance in each case. The writers here desire to thank those physicians who coöperated with them in this study. In this group of 496 persons, 12 or 2.4 per cent. showed the Widal reaction present and 4 showed a partial reaction in a dilution of 1:50. These cases occurred early in the investigation when it was not possible to follow them further.

Group II consists of 521 persons, including 13 cases of glandular and 2 cases of bone tuberculosis, all of whom were patients in tuberculosis sanatoria. In the large majority of these evidence of tuberculosis had been demonstrated by the finding of tubercle bacilli. In the remaining ones the clinical diagnosis was accepted. Of the 521 specimens, 16 showed the Widal reaction present in a dilution of 1:50 or higher, 3 showed a partial reaction 1:50 and in the remaining 502 the reaction was absent. Accurate history regarding previous typhoid infection was not obtainable from 102 negative cases examined from one sanatorium for the tuberculous insane owing to the nature of the patients. In the remaining 400 negative cases 60 gave a definite history of

typhoid fever anywhere from 2 to 46 years previously and 8 others gave doubtful histories of typhoid fever. Owing to the distance from the laboratory of 4 cases showing a positive Widal reaction, it has been impossible thus far to obtain specimens of feces and urine from them. One of these 4 gave a history of typhoid fever 6 years previously. The remaining 15 cases, 12 of which gave a complete and 3 a partial reaction, have been further studied in reference to typhoid infection by bacteriological examinations of the discharges. One of the 12 cases was convalescing from a known attack of typhoid fever and so should be omitted.

Of the remaining 11 cases giving a positive agglutination, B. typhosus or B. paratyphosus has been isolated from the discharges of seven—one giving a history of typhoid fever 33 years previously and one giving a doubtful history. The remaining cases claimed they had not had typhoid fever. From the other 4 cases typhoid bacilli have not yet been recovered as there has been trouble in securing the specimens. Two of these cases have had but one examination, one has had three examinations and the fourth case has had only one unsatisfactory examination, the specimens being delayed in reaching the laboratory a sufficient period to make the isolation of B. typhosus if present almost impossible. Three of these 4 cases gave a history of typhoid fever 2, 17 and 27 years previously.

Specimens of the discharges of the 3 cases showing a partial Widal reaction in a dilution of 1:50 have been examined only once in 2 cases and twice in the third case but with negative findings.

The following table summarizes these results.

	Number Examined	No. Widal +1:50	History of Typhoid Fever	Bacteriological Findings	No. Widal Atyp. 1:50	History of Typhoid Fever	Bacteriological Findings
Group I.....	496	12		No examinations made	4	0	No exams. made
Sanatorium I.....	104	2	0	B. typhosus from urine and B. paratyphosus from feces	0		
			0	B. paratyphosus from feces			
Sanatorium II.....	101	6	Convalescing.	3 examinations made.	0		
			2 years ago.	2 examinations made			
			17 years ago	3 examinations made			
			0	B. paratyphosus from urine			
			0	B. paratyphosus from urine			
			0	B. paratyphosus from feces			
Sanatorium III.....	74	2	27 years ago	1 unsatisfactory examination	2	0	2 exams. made
			33 years ago	B. typhosus from feces		0	1 exams. made
Sanatorium IV.....	135	3	0	No examinations	0		
Sanatorium V.....	71	1	6 years ago	No examination	0		
Sanatorium VI.....	16	2	0	B. paratyphosus from feces	1	0	1 exam. made
				1 examination only			
Sanatorium VII.....	20	0	2		0		

In this series of 1017 persons suffering from tuberculosis the blood serum of 28, or 2.7 per cent, gave a positive Widal reaction while 7, or 0.68 per cent., gave an incomplete reaction.

Excluding from Group II the case convalescing from typhoid fever, there were in 520 tuberculous persons 15, or 2.9 per cent., whose blood serum gave a positive reaction and 3, or 0.59 per cent, a partial reaction. While the feces and urine of but 14 of these cases, 11 with a complete and 3 with a partial reaction, have been examined bacteriologically, 7 have been shown to be carriers of typhoid or paratyphoid bacilli. When it is remembered that daily examinations of discharges over extended periods of time, as for 70 days, as reported by Semple and Greig, have failed to demonstrate typhoid bacilli in a chronic typhoid carrier, it appears that there is little reason for believing that the Widal reaction in the tuberculous indicates anything short of present or recent infection with members of the typhoid group.

The writers wish to express their thanks to the physicians who assisted in obtaining specimens, especially to Drs. G. W. Beach, W. J. Marcley, A. T. Laird, and A. Josewich.

REFERENCES

1. Wien. Med. Wchn., 1907, Jan. 26.
2. Bull. Acad. Roy. de Med. de Belg. Brus., 1909, 4 s., xxiii, 499.
3. Presse Med., Paris, 1910, xviii, 124.
4. Rev. Internat. de Med. et de Chir., Paris, 1911, xxii, Nr. 2, 19.
5. Jour. A. M. A., 1913, lxi. ii, 1893.
6. Proceedings 10th Annual Meeting Nat. Assn. for Study and Prev. of Tuberculosis, 1914, p. 89.
7. Deutsch. Med. Wchn., 1907, xxxiii, i, 4 and 58.
8. Münch. Med. Wchn., 1909, lvi, i, 1016.
9. Zeits. f. Hyg., 1905, xlix, i,
10. Zentrlb. für innere Medizin, 1910, xxxi, Nr. 1, 1
11. Jour. A. M. A., 1897, xxix, ii, 7.
12. Le Bull. Med., 1897, xi, 313.
13. Münch. Med. Wchn., 1908, lv, Nr. 1, 1113.
14. Zeits. f. Hyg., 1914, lxxviii, Nr. 3, 555.
15. Stras. Med. Zeit., 1906, iii, 101.

SOME OBSERVATIONS ON STREPTOTHRIX INFECTIONS AND THEIR RELATION TO TUBERCULOSIS*

By David John Davis, M.D.
Chicago

Tuberculosis and streptotrichosis are closely related diseases, not only clinically but etiologically. Confusion in diagnosis is therefore inevitable. It is the common opinion among medical men that streptotrichosis is not only rare in relation to tuberculosis but rare, speaking absolutely. The former statement is true, the latter apparently is not; many who have investigated streptothrix infections assert that they are not very uncommon and that such cases especially of the pulmonary type are mistaken often for tuberculosis.

This is undoubtedly true especially in certain countries or localities. Infections with these higher organisms tend to be more or less limited in their distribution. A good illustration of this is the occurrence of the somewhat closely related disease, sporotrichosis, in fairly well defined regions on the earth. It has been pointed out by Ruediger[1] that with very few exceptions the 60 or more human cases of sporotrichosis in the United States have occurred along the Missouri River. In France this disease is very common, but extremely rare in adjacent countries. The limited occurrence of coccidioidal granuloma in California is another illustration.

The various diseases caused by varieties of streptotricha likewise seem to show a regional distribution. Madura foot is a disease quite definitely limited to certain countries in the tropics. To what extent other infections with streptotricha are localized in certain regions or are diffusely scattered in various countries is not altogether settled but the data when viewed as a whole would seem to point to a more or less regional distribution. For example, Foulerton[2] in England has observed and studied in his own service 78 cases of streptotrichosis of lungs, head, neck, appendix, etc.; he thinks that it is far more common than generally believed, many cases being mistaken for tuberculosis. In California the reports of Bridge[3] and of Edith Claypole[4] would seem to indicate that here such infections are relatively common. Both of these writers comment on this point and believe it is far more frequent than is usually thought, not only in this locality but generally. Opokin[5] in Russia and Captain Kremer in Hawaii have pointed to the frequency of the lesion in Russia and the Sandwich Islands respectively. Whether or not the disease is as common in all localities as in these mentioned, where it has been studied carefully by the workers cited, is possible but at present data is lacking to prove it.

* From the Department of Experimental Medicine, University of Illinois.

As already intimated the disease of streptotrichosis clinically is often indistinguishable from tuberculosis. Like tubercle bacilli and sporotricha streptothrix organisms may attack any organ of the body. But it is in certain localities in the body that infections of this type and tuberculosis are especially difficult to differentiate, namely, infections of the lung and the lymph glands. Practically all the cases of pulmonary infection of streptothrix run the fairly typical course of chronic phthisis and the true condition is only determined by possibly some complication such as a perforating empyema or by microscopic studies of sputum, discharges, etc. It has also been shown conclusively that infection with both tubercle bacilli and streptothrix may occur in the same individual and give rise to definite specific reactions. (Claypole.)

In connection with the study of the relationship of organisms concerned in these infections we meet with certain questions that are difficult and as yet obscure. We must recognize in the first place that we are dealing with a large group of organisms whose characteristics are apparently very plastic; therefore we should be cautious about overemphasizing small differences between strains. The same problems but even more pronounced have arisen here that have been met with for example in the sporothrix group, the blastomyces group and indeed to a certain extent in practically all groups of bacteria. Naturally one of the results of the occurrence of a large group of closely related but slightly different organisms has been a conflicting and a confusing nomenclature. And so we have the generic terms, streptothrix, cladothrix, nocardia, actinomyces, oospora, etc., applied to them.

This matter of group relationship has been greatly simplified and clarified by the work of Claypole[6] who by means of the complement deviation test was able to determine the relationship between various members of this group and also their relation to tubercle and leprosy bacilli. She used a large number of strains including among others several actinomycetes, streptothrix madurae, S. asteroides, S. nocardii, S. eppingerii, S. coprae, Bacillus leprae and B. tuberculosis. Some of these organisms are acid fast. She concludes that it is impossible to draw a sharp line between the various strains from any point of view, morphological, biological or serological. They form a more or less continuous series and she indicates the change which is gradual from the mycelial organisms to the bacillary acid fast organisms, by curves which represent fixation with any given antigen.

More recently[7] the same investigator has written on human streptotrichosis and its differentiation from tuberculosis with especial reference to specific skin reactions with streptotrichins. These were prepared from glycerinated broth cultures of certain strains of streptotricha. Her work in this respect is so important and so directly concerned with the subject of this paper that I quote her main conclusions:

1. "Streptotrichosis is more common than generally supposed and frequently not differentiated from othe infections; especially is it confused with tuberculosis. Clinical signs are not characteristic enough to determine the diagnosis accurately.

2. "Discharges—sputum, pus, etc.—should be carefully examined fresh in as large quantities as possible, and smears stained with carbolfuchsin and gram stains. The amount of decolorization in the carbolfuchsin preparations should be varied so as to differentiate the less acid-fast types.

3. "Streptothrichins (glycerinated bouillon cultures, concentrated), made from the non-acid fast mycelial and partly acid-fast bacillary organisms, give definite skin reactions on persons with frank infections, but do not show on controls (persons presumably non-infected) including cases of recognized tuberculosis. This either shows the infection to be less general than that due to the tubercle bacillus or else the reaction to be a less long-lasting one.

4. "Streptotrichosis and tuberculosis may exist in the same person at the same time, as evidenced by the appearance of both organisms in the sputum and both skin reactions.

5. "Gland and bone infections with streptotriches may be demonstrated by skin reactions as well as lung infections. This still further broadens the field for confusion between the tuberculoses and streptotrichoses."

Aside from the clinical similarities of these infections to tuberculosis the resemblances of the infecting organisms to tubercle bacilli are striking and are of especial importance to the clinical bacteriologist. Very early it was noted that certain members of this group were acid proof thus simulating tubercle bacilli; and on the other hand the branching forms of tubercle bacilli not infrequently met with likewise pointed to a biological relationship between the two. The acid and alcohol proof properties vary considerably and while it is a striking characteristic it is not to be relied on too exclusively for purposes of classification. Certain strains have been observed to lose this property on artificial cultivation; others again acquire it only after long growth on artificial media. Also in cultures as a rule only certain parts of the mycelial growths retain the stain.

The statement may be made that none of the acid proof strains of streptothrix are as strongly resistent to acids and alcohol as is the average strain of tubercle bacillus.

Apparently all degrees of resistance exist among the various strains. This point is an important one especially in the staining of sputum for the possible presence of streptotricha. It is well never to use more than 1 per cent. acid for decolorizing carbolfuchsin in such a preparation. Their resistance to alcohol also varies though this is not always true. In a case that I observed with many branching streptotricha in the sputum this property was studied carefully. The organisms stained readily with carbolfuchsin but their resistance to decolorizing, while striking, was distinctly less than that of tubercle bacilli. Ninety-five per cent. alcohol for 3 minutes did not decolorize them nor did 2 per cent. nitric acid in 95 per cent. alcohol for 3 minutes. In one minute 10 per cent. nitric acid alcohol did not decolorize but after 3 minutes they were completely decolorized. Thirty per cent. acid alcohol destained completely in 1 minute. Aqueous acid solutions decolorized approximately like the alcohol acid mixture. In these experiments tubercle bacilli were mixed into the sputum and served as a control.

Many varieties of streptotricha do not show this acid proof property, others show it very slightly. A number of strains which I tested revealed acid

fastness only for certain parts of the mycelium, especially the expanded ends. This was true of actinomyces albus and actinomyces pleuricolor. It was not true of actinomyces asteroides, actinomyces pulmonalis, actinomyces madurae and two others that I tested.*

Since such a large number of infections of this type are pulmonary and the diagnosis so often rests on an examination of the sputum the behavior of these organisms to certain disintegrating fluids especially antiformin is of considerable importance. This is true, too, because the streptothrix infections give the clinical findings of tuberculosis without tubercle bacilli and hence it is in just such cases that special methods for detecting tubercle bacilli are apt to be used. I have considered it worth while therefore to inquire rather carefully into this point.

In the sputum of a case containing large numbers of weakly acid and alcohol fast streptothrix repeated examinations using the antiformin method showed complete disintegration of these organisms. This was true when the method was used according to Loeffler.[8] For controls tubercle bacilli were added to this streptothrix sputum. Smears were stained by both the Ziehl-Neelsen's stain with counter methylene blue and the Gram method. In both the tubercle bacilli were readily found but in neither could the streptothrix organisms be seen. It was shown that they not merely lost their acid fast property by this treatment but that they were completely dissolved.

It was found that by lessening the amount of antiformin in the mixture the branching streptotricha would to a certain extent resist its action as compared with other sputum bacteria. They seem to be therefore, in reality, weakly resistant to antiformin in a way analogous to their weak resistance to acid decolorization. However, 25 per cent. antiformin which is the strength usually used is sufficient to completely dissolve them and therefore not less than this amount should be used for their disintegration. It follows that the antiformin method as used for tubercle bacilli should not be employed in suspected cases of streptotrichosis. Staining with carbolfuchsin and decolorzing with not over 1 per cent. acid will be most useful because both tubercle bacilli and acid fast streptothrix organisms will appear. For the non-acid-proof streptotricha a gram preparation is of course indispensable. These procedures have been applied to a number of different strains of streptotricha and all gave corresponding results.

The pathogenic action of certain streptotricha has now been generally conceded. There are many varieties of saprophytic organisms of this type especially in the soil and water most of which are of no interest to us here. The possibility that certain of these strains have potential pathogenic action for animals and man is to be remembered; many believe this to be a fact. There does not seem to be any reliable evidence to indicate clearly that the disease is directly transmitted from individual to individual.

In this connection I might cite a case which I observed recently at St. Luke's Hospital, Chicago, and which has been studied and will be reported

*Some of these strains were obtained from the collection of the American Museum of Natural History, New York.

soon by Dr. Baugher. A middle aged woman was admitted with several subcutaneous abscesses chiefly localized on the extremities. She gave a history of having worked sometime previously in Florida in a garden with rose bushes, the thorns of which had injured her skin in various places. Pus from several of these subcutaneous abscesses gave a pure culture of a freely growing gram positive streptothrix which was not acid or alcohol proof. The cultures are pinkish white and tiny drops of clear fluid collect on the surface. It grows rapidly and gives off a very strong earthy or mouldy smell. In the pus the branching mycelial threads were easily found but careful search revealed nothing suggesting sulphur granules or ray-like masses. The presence of this streptothrix in pure culture and the significant history would suggest very strongly that this organism belongs in Foulerton's group I, the members of which closely resemble in many respects certain types of saprophytic streptotricha common in soil and water.

The pathogenicity of acid fast streptotricha appears to vary greatly. The first of this type described was that which causes "farcies du boeuf," a tuberculous-like infection in cattle and is highly pathogenic for animals producing a tuberculous condition in guinea-pigs on artificial inoculation. This organism is now commonly called streptothrix nocardii after Nocard who in 1888 first identified it. It is from this fact that J. H. Wright and some others have contended that the term "Nocardia" should be applied to the group of acid-fast streptotricha. In this connection I shall say a word about classification and nomenclature. Güssow[9] recently has discussed this point with such clearness and reasonableness that I think this position deserves careful consideration. He points out that "streptothrix" was used by Corda in 1839 for an entirely different genus and cannot be properly applied to these organisms. He contends that Harz in 1878 established the generic term "actinomyces," the species actinomyces bovis he described as the cause of "lump jaw" in cattle. On this basis Güssow has corrected the nomenclature of this group using consistently the generic term actinomyces. Streptothrix nocardii referred to above he calls accordingly actinomyces farcinica.

Other pathogenic acid fast streptothrica are streptothrix coprae, an organism isolated from lung lesions in goats which was pathogenic for guinea pigs and rabbits and streptothrix eppingerii first described by Eppinger in a case of pulmonary disease associated with cerebral abscess. Many of these latter infections have now been reported. In some, as was true of Eppinger's case the streptothrix was pathogenic for animals. In others, though the evidence strongly points to this organism having a definite pathogenic action for man, inoculation of animals is often without result. This was true of a case which the writer recently observed and reported.[10] Though the acid proof branching threads were very numerous in the thick greenish sputum, injection into guinea pigs, rabbits and rats produced no lesions of a specific nature. In some cases of this type it may very well be that these acid proof organisms are in the nature of secondary invaders which, when once implanted in the tissues and growing freely, may cause further disintegration of tissues often of a gangrenous nature. Such is the view of Ophüls[11] who has described 5 cases of pulmonary gangrene in the lesions of which acid proof branching thread forms

were found at autopsy. In practically all cases of this character other organisms of a pyogenic nature have been found.

The statement is often made that streptothrix infections of the tonsils are not uncommon and that the tonsillar crypts frequently harbor organisms of this type. Certain granules commonly referred to as actinomyces-like granules occur in the tonsillar crypts of most persons. They have been repeatedly confused with true actinomyces.

The writer recently has shown[12] that these granules consist of masses of three kinds of bacteria, namely, fusiform bacilli, spirilla forms and streptococci. The fusiform bacilli grow in long threads which run in ray-like fashion toward the periphery of the granules where in terminal brush-like structures the typical fusiform bodies arrange themselves around a central stalk of longer filaments. These structures have no relation whatever to true actinomyces. In an examination of the crypt content of many tonsils I have not found any typical gram positive branching forms suggestive of streptotricha or actinomyces. The statement often found in the literature that actinomycosis commonly originates in the tonsils may therefore be called into question.

I have gone over the literature in this respect very carefully and have not found a single well authenticated case in which the evidence clearly demonstrated the tonsils or the tonsillar crypts to be the atrium. No clear cut case of actinomycosis or streptotrichosis of the tonsils is reported in such extensive series as that of Foulerton, Boestroem, and Erving. Should such infections arise in the tonsil it is reasonable to believe that a characteristic local lesion would result such for example as occurs in the appendix, a common seat of definite actinomycotic lesions. I would not state that streptotrichal and actinomyces infections never do originate here. The crypts would seem to be an excellent place for the growth of such germs; but definite proof that they do grow there is still wanting.

Attention should be called to the fact that though as a rule it is not difficult to find streptothrix organisms in pus and other discharges, at times this may require long search and careful cultural examination. Ordinarily but not always is a gram preparation sufficient to detect them. In one case that I examined recently most careful search of the pus from a lesion in the region of the jaw revealed no ray fungi nor organisms of any kind. Inoculation of sugar media with a large amount of pus gave after some time a single colony of a typical gram positive branching streptothrix. In another case which I studied of bilateral streptotrichos is of the ovaries with involvement of one fallopian tube, pus from the ovarian abscesses revealed only a few branching filaments but no granules. After careful search only one ray form with clubs was found well within the infected tube. These were both instances of pure infection with streptotricha. The difficulties might be far greater at times in case the lesion occurs in certain organs, such as the lung, where mixed infections, often with somewhat similar organisms, is the rule.

SUMMARY

1. Streptothrix infections are not so uncommon as is generally believed by practicing physicians.

2. They are often not distinguishable clinically from tuberculosis.

3. Streptotricha include a large group of saprophytic and parasitic organisms characterized by their plasticity and pleomorphism. Some produce ray forms, others do not.

4. Certain varieties are acid and alcohol fast. None apparently are as acid proof as is the tubercle bacillus.

5. It is possible to distinguish them by laboratory tests and specific reactions (Claypole).

6. The streptotricha are relatively non-resistant to antiformin.

7. Sputum should not be examined by the antiformin method when such organisms are suspected. Nor should strong acids be used in decolorizing carbolfuchsin stains.

8. Certain strains are undoubtedly highly pathogenic for animals and man. Some may be of doubtful pathogenicity, but important in producing secondary changes in tissues.

9. Granular masses in tonsillar crypts often mistaken for streptotricha or for actinomyces are composed of masses of fusiform bacilli, spirochaetes and streptococci. It is doubtful whether any well authenticated case of streptotrichosis of the tonsils has ever been reported.

1. Jour. Inf. Dis., 1912, 11, 193.
2. Lancet, 1913, p. 381.
3. J. A. M. A., 1911, lvii, p. 1501.
4. Arch. of Int. Med., 1914, vol. 14, p. 104.
5. Arch. fur Klin. Chir., 1909, lxxxviii, 319.
6. Jour. Exp. Med., 1913, xvii, 99.
7. Arch. of Int. Med., 1914, 14, p. 104.
8. Deutsche Med. Woch., 1910, vol. 36, p. 1987.
9. Science, 1914, vol. 39, p. 431.
10. Archives of Int. Med., 1914, 14, p. 1.
11. Jour. of Med. Research, 1902, 8, p. 242.
12. Davis: The actinomyces-like granules of the tonsils. Jour. Inf. Dis., 1914, vol. 14 144.

COMMUNICABILITY OF THE AVIAN TUBERCLE BACTERIUM TO MAMMALS*

By L. R. Himmelberger, D.V.M.

Lexington, Ky.

The author desires to present in this communication to this Society the results of studies of tuberculosis as caused by the avian type of tubercle bacterium and the possible transmissibility of this type of tuberculosis to mammals. In a previous publication (Cent. f. Bakt., 73, 1914), the author presented evidence that a tuberculous condition could be produced in calves by feeding mascerated organs from diseased birds in milk. This condition was produced in two calves and the tubercle bacilli were easily demonstrated in microscopic preparation. The use of cultures of the avian tubercle bacterium by Sir John M' Fadyean in the immunization of cattle against tuberculosis suggested to the writer the need for a comparative study, as regards virulency, of the avian and bovine type of organism. In view of the fact that the work of Park and Krumwiede in studying the comparative virulence of human and bovine cultures has shown that bovine cultures produced in rabbits a marked generalized tuberculosis, while human cultures under similar conditions will produce but localized types of the disease in our work we have confined ourselves to a study of the type of disease produced in rabbits by the avian organism when injected intravenously. In thirty animals injected intravenously with living cultures of the avian tubercle bacillus all but three developed a generalized tuberculosis, and one of those resulting negatively presented no lesions whatever.

In view of the results obtained in the work carried on by us we wish to suggest that it is entirely within the realm of possibility that avian tuberculosis can be communicated to mammals and that inasmuch as calves have been proven susceptible to the avian bacterium, the best interests of public health demand that recognition be given this organism in any attempt at tuberculosis control whether that attempt be made in reference to man or animals, and we also wish to call attention to the desirability of demanding poultry inspection in addition to inspection of other meat products. Furthermore we desire to emphasize the danger involved in vaccination procedures with avian cultures, inasmuch as a tuberculous condition might be produced in the vaccinated animal which as a result would become a menace to public health.

* From the Laboratory of Animal Pathology, Kentucky Agricultural Experiment Station

TUBERCULOSIS OF THE OVARY

By C. E. Royce, M.D.
Iowa City, Ia.

Any consideration of ovarian tuberculosis brings into focus certain questions. These relate to its occurrence, source, lesions, and its effect on the functions of the organ.

Statistics of this affection of the ovary have accumulated until it may be said that none but an exceptionally long series of observations would serve to alter materially what has already been compiled concerning it. The whole process as it affects the ovary is so closely related in all its particulars to tuberculosis of the adjacent pelvic viscera that its study involves inevitably, some consideration of the more general subject, tuberculosis of the female genitalia.

The observations that have been made and the experiments performed and recorded, create a literature which may be reviewed with interest and profit.

The occurrence of ovarian tuberculosis naturally divides itself for discussion under two headings; primary and secondary. Its occurrence primarily in the ovary may be shortly dismissed. If admitted at all, it is admitted to be very rare. The prevalence of undemonstrative, unsuspected, tuberculous lesions is so well known that without exhaustive post mortem search, we should not presume to speak of a primary ovarian tuberculosis.

The occurrence of tuberculous lesions in the ovary secondary to tuberculous foci elsewhere in the body is comparatively infrequent. Mlle. Tordorsky[1] in her thesis on "Tuberculosis of the Ovary," credits Louis with its first description in 1825. In performing autopsies on tuberculous women, he reports that the ovaries were involved in the proportion of 1 in 20. From 1825 to the early '60's, many tuberculous ovaries were found, their diagnosis being based on gross appearances and clinical signs. With the appearance and use of the compound microscope the number of diagnoses of tuberculosis of the ovary dropped and it was felt that the earlier observers had been mislead by the gross appearance; small fibrous bodies on the surface and yellowish masses in the substance of the organ coincident with active sexual life being mistaken for tubercules.

Schlimpert[2] offers figures on tuberculosis that are large enough to attract attention. His work covers examinations of 3514 female cadavers, 2173 or 61.8 per cent. of these were found tuberculous in some form or other. Only 29 per cent. of the 2173 were diagnosed during life as tuberculous. Of the 2173 tuberculous, the genitals were involved in 3.35 per cent. Specific figures regarding the ovary are not given, but in connection with the large number of observations the comparatively small number of those showing genital tuberculosis throws light on ovarian tuberculosis indirectly. The very numbers

give importance to the statement that no instance of primary infection of the genital tract or urinary apparatus was discovered. It is the opinion of Schlimpert that a blood borne infection was possible in most of those cases of genital tuberculosis which he enumerates. He is certain that five of them were blood borne and considers 28 others as probably conveyed in this manner. In no case was genital tuberculosis the cause of death.

Kroemer[3] reports 267 cases of tuberculosis of the female genitalia with the following relative frequency of involvement.

Of 267 cases the tubes were involved in 222, the uterus in 67, the ovary in 42, the vagina in 16, and the cervix in 11.

Other observers have reported cases in such numbers that the characteristics, types and influencing factors in ovarian tuberculosis may be discussed with a degree of helpfulness.

The experimental work that has been done to determine the path of infection in genital tuberculosis, has an equal bearing on its presence in the ovary. Three routes are admitted possible, i.e., through the blood stream, through the lymph channels and by continuity of surface. The latter path is commonly termed that of ascending infection.

Experiments have been made with inert dyestuffs and with emulsions of virulent tubercle bacilli. Sugimara[4] injected or placed in the upper part of the vaginae of experiment animals a suspension of carmine in cocoa butter. Autopsy discovered the carmine not in the horns of the uterine cavity, but in the wall of the uterus. Inasmuch as an emulsion of tubercle bacilli is heavier than the cocoa butter suspension, he does not admit the possibility of ascending tuberculous infection of the female genital tract. Bauereisen[5] introduced into the vaginae of guinea pigs virulent cultures of tubercle bacilli and found that with sufficiently virulent cultures, lesions of the vagina were established and that dissemination of the infection into the broad ligaments took place through the lymphatics. No spontaneous intra-canalicular ascension of the tubercle bacilli was demonstrable in the normal animal. Cornil[6] and Dobrokulsky introduced tubercle bacilli into the vaginae of guinea pigs and obtained tuberculous lesions of the mucosa of the uterus, but never found them in the ovary. Blau[7] performed the same experiment and in 6 guinea pigs obtained no reaction whatever. He also performed laparotomies and injected tubercle bacilli into both the uterine cavity and into the uterine muscle. In these cases if the animals were pregnant, a local tuberculous reaction followed in 50 per cent. of the cases. If the animal was not pregnant, no tuberculosis resulted either in the uterus or in the lower genital tract. Blau concedes that the semen of tuberculous individuals may contain virulent tubercle bacilli, but the infrequency of genital tuberculosis among the wives of tuberculous husbands makes the likelihood of ascending infection very improbable. He considers that the secretions of the vagina inhibit the growth of the tubercle bacilli.

Kolischer[8] in summing up the subject of genital tuberculosis of the female, says that while some writers claim that it may occur directly from semen bearing tubercle bacilli, most authors concur that the path is by the blood or lymph channels.

The nature and progress of reaction to the presence of tubercle bacilli in the ovary does not differ much from reaction under similar circumstances by other organs.

The ovary exhibits varying appearances according to the length of time that the process has existed. Ordinarily the surface is irregular and nodular. Sometimes tubercles are seen on the surface. More often they are found on cutting into the tissue. As the lesion progresses the centers of the tubercles become caseous, the tubercles coalesce and a cold abscess of the ovary forms. In such a case nearly all the ovarian tissue is destroyed. The cold abscess may rupture into the vagina or rectum or eventually discharge through a sinus into the groin.

Poncet and Leriche[9] tell of atypical ovarian tuberculosis, without tubercles or giant cells which they call inflammatory tuberculosis. They base their claim on the sclero-cystic condition of the ovaries found in nearly all the tuberculous females that they autopsied. They regard the sclero-cystic ovary as a forerunner or as a manifestation of latent tuberculosis. That is, foci of tuberculosis elsewhere are indicated by an inflammatory reaction in the organs of internal secretion especially where the blood supply is large.

Still another form of ovarian tuberculosis of which one observation has been published by M. Tiedenat is that of tuberculoma hypertrophica. The instance cited is an ovarian tumor, weighing 450 grams, found in the midst of dense adhesions. Definite tubercles were demonstrated The uterus was involved but the adnexum of the opposite side was free.

Finally, ovarian cysts may become the seat of tuberculous processes. Pollosson[10] cites a well marked instance where the accompanying tube was purulent. There was nothing in the voluminous mucoid cyst to indicate tuberculosis but examination of its wall disclosed the typical lesions. Others (Glockner,[11] Lagothetopoulos),[12] have seen dermoid cysts undergoing tuberculous degeneration.

Cohn[13] in a study of 14 tuberculous ovaries mentions an isolated focus in a dermoid cyst on the opposite side from the tuberculous tube as an instance of blood carried infection. Pampanini[14] presents a study of 150 specimens including fibroids and cancer of the uterus and ovarian cysts. Tuberculosis of the genitalia coexisted three times with fibroid uterus—nine times with ovarian or parovarian cysts and once with cancer of the uterus. In all cases it involved the tubes and in two cases the uterus also. Of the 9 cysts associated with tuberculosis of the tubes 4 were themselves tuberculous.

The influence of the ovary on the menstrual function is apparently much modified in the tuberculous, regardless of whether the ovary is infected directly or not. Among 118 tuberculous females 14 had amenorrhoea, while 70 suffered from dysmenorrhoea. Of the 70 dysmenorrhoeic 53 were treated with tuberculin. Eight were unimproved, 5 had less painful menstruation while 40 were completely cured of their dysmenorrhoea (Poncet and Leriche).

Tuberculosis operates in two ways to interfere with and eventually prevent ovulation. First by the inflammatory process, nonspecific in its lesion, which thickens the connective tissue of the ovarian cortex and produces the microcystic ovary from failure of the Graafian follicles to rupture, and secondly,

by the more or less complete destruction of ovarian tissue which results from invasion of the gland by tubercle bacilli. The possibilities of transmission of a tubercle bacilus into an embryo through the ovum seem nil in the presence of the destructive effect of the bacillus on the ovarian tissue.

Tuberculous subjects are seldom admitted or retained at the University Hospital. Among 82 ovaries examined, one was found infected with tuberculosis. The ovary was three times its usual size. Section showed its interior to be filled with pus and the walls of the cavity studded with tubercles. Giant cells were numerous and large, frequently with tubercle bacilli demonstrable in the confines of the cell (Ziehl-Neelson technique). The corresponding tube was the seat of a chronic suppurative process, but no tuberculosis was demonstrable. Clinical examination showed active foci in the lungs.

Tuberculosis of the uterine mucosa has been seen once and of the Fallopian tubes twice; one of the latter two instances being associated with the tuberculosis of the endometrium.

CONCLUSIONS

1. Primary tuberculosis of the ovary does not occur.
2. Secondary infection of the ovary by the tubercle bacillus is comparatively infrequent, and occurs principally by the blood channels.
3. Tuberculosis of any part of the female body frequently produces painful menstrual disturbances by its sclerotic action on the ovary.
4. Tuberculosis, whether affecting the ovary with its specific lesion or not, inhibits or destroys the possibility of ovulation.

REFERENCES

1. Todorsky, Mlle. Olympiad: La tuberculose de l'ovaire. Montpellier, 1913, 55 pp. No. 18. 8°.
2. Schlimpert H.: Die Tuberkulose bei der Frau, insbesondere die Bauchfell und die Genitaltuberkulose, die Tuberkulose des uropoetischen Systems, die Tuberkulose wahrend Schwanzerschaft und wockenbett, auf Grund von 3514 Sektionen. Arch. f. Gyn., 1911, xciv, p. 863.
3. Kroemer: Die Diagnose und Therapie der Genitaltuberkulose des Weibes. Deutsche Med. Wchnschr., 1911, xxxvii, p. 1057.
4. Sugimara: Ueber die aszension der Tuberkulose in weiblichen Genitaltraktus. Centralblatt fur Bakteriologie, Jena, 1912–13, lxvii, Orig, 420–423.
5. Bauereisen: Die ausbreitunzswege der Genitaltuberculose. Arch. f. Gyn. 1912, xcvi. p. 217.
6. Cornil: Note sur les tubercules de l'ovaire. Bull. et Mem. Soc. Anat. de Par., 1905, lxxx, 433.
7. Blau, Albert: The origin and method of extension of tuberculosis from the genitals of the female. S. Klarger, Berlin, 1909.
8. Kolischer G.: Tuberculosis of the tubes, bladder and ovaries. Surgery, Gynecology and Obstetrics, 1911, xii, p. 341.
9. Poncet et Leriche: Tuberculose inflammatoire de l'uterus et de ses annexes. Academie de med. de Paris, juin, 1910, pp. 504–538.
10. Pollosson: Tuberculose d'un kyste de l'ovaire. Soc. de. chirur., Lyon, 1905.
11. Glockner: Cancer de l' ovarie avaire a des lesions tubercu. Centralblatt f. Gyn., 1904, p. 702.
12. Lagothetopoulos: Tuberculose de kystes dermoides bilateraux des ovaires. Centralblatt f. Gyn., 1908, p. 377.
13. Cohn: Zur Pathologie der ovarieltuberkulose. Arch. f. Gyn. Berl. 1912, xcvi, pp. 497–524.
14. Pampanini: Contributo alla casistica dell' associaszione tubercolare e neoplastica genitale. Ann. di. ostet., Milano, 1913, i. p. 217.

SOCIOLOGICAL SECTION

Chairman

GEORGE J. NELBACH

New York

Secretary

SEYMOUR H. STONE

Boston

THE OFFICIAL RESPONSIBILITY OF THE STATE IN THE TUBERCULOSIS PROBLEM

By William Charles White, M.D.

Pittsburgh

The achievement we all desire to result from our efforts in the tuberculosis campaign is the human control of this disease. Such control must apply to our whole country without demarcation of State, county, or municipal lines.

Any given unit of population, occupying any given territory, no matter how small the unit, that can demonstrate the accomplished control of this disease will solve the problem for the whole nation. The adaptation of this demonstration, in the ultimate control, would be but the multiplication of the equipment necessary, for each additional unit of population.

Unfortunately such a demonstration has not yet been accomplished for human tuberculosis and we are still trying unproved methods on larger and smaller scales from many different angles by Federal, State, and local agencies.

Perhaps the most significant single demonstration of the control of tuberculosis has been accomplished by Bernard Bang, in cattle tuberculosis, for the State of Denmark. Bang has shown conclusively two things.

First, that the tubercle bacillus is not ubiquitous, and second, that by control of housing conditions, removal of infected cattle, and protection of the newly born throughout life, tuberculosis in herds of cattle can be eradicated.

At the time of the federation of the American States, only such powers as concerned the whole people were vested in the Federal government. No one who reads the early struggle of the powerless first assembly in its endeavor to gain a foothold against the opposing greed of "States Rights" and the gradual solution of this mass of opposition by the skill of Hamilton and the honesty of Washington and compares this with the Washington of today can close his eyes to the singular development of a central government whose authority transcends that of any other earthly power. A century of evolution has given us a federated system of control of which we grow increasingly proud. Even yet, however, there appears again and again that slippery chute, called "States Rights" on which our ablest agents of government start their downward course to oblivion.

Even as the struggle for central power in the matter of army, navy, and taxation, took years of evolution, in gathering and dispensing education, to accomplish the present condition, so the struggle for central power in the matter of the uniform health and welfare of the American populace must take years to establish. Owing to greater ease of rapid education, and greater opportunity for study, our progress in this direction is more gratifying. Only last month, however, did the State of New York reach a stage

of enlightenment sufficient to see the gain of passing the port of New York over to Federal control.

If in measuring the importance of Federal duties, we ask ourselves what most concerns the welfare of the whole people, the uniform answer is naturally the nation's health. Without health there can be no wealth nor law nor war. While responsibility for securing the health of the nation may be apportioned out to the various governmental agencies, the central government must be at least responsible for the promulgation and uniform application of methods of control.

Applying this conception of Federal duty to the tuberculosis problem, we are struck with certain phases of the question which are frequently unthought of, but no less necessary to consider in draughting a general Federal scheme. There are—

First. The universality of the malady in man and beast, and the possibility of the transfer from one to the other.

Second. The disease is a hidden one. It is almost impossible to pick out the tuberculous sufferer. In his earlier stage his morning pulmonary toilet removes the marks of his malady for the day, and when the far advanced consumptives by rest and care take on the appearance of health, it is especially difficult to spot the disease.

Third. Tuberculosis is closely associated with all the social problems of housing, food, wages, rest, clothing, and insurance and can in no way be separated from them.

Fourth. So long as intercity, interstate and international modes of travel carry daily in commerce, clothing, food, animals and human sources of infection across the borders of cities, States, and countries we are forced in matters of control to higher and higher courts of appeal and centralization of power till at last the Federal and international courts are reached.

What then is the duty of the Federal government? I would suggest that its first duty is to prove in one of the territories under its wardship what constitutes a proper system of control. As a first test it might determine if the principles of the Bang systems are applicable to the human race.

An extensive experiment of this sort would follow some such lines as this.

First. A tuberculin skin test of all members of the unit.

Second. A clinical examination (physical and laboratory) of all reacting cases.

Third. The segregation of all open cases.

Fourth. A careful study of housing conditions.

Fifth. A disinfection by paint and scrubbing of all infected quarters.

Sixth. The establishment and maintenence of proper living conditions, including supervision of food, air, clothing, and rest of all non-reacting cases.

Seventh. Control of all food supply. Especially the pasteurization of all food supplies from cattle, hogs, and fowls.

Eighth. Periodical tuberculin tests and subsequent segregation of reactors and so on.

The Federal government had no hesitation in establishing a similar precedent for other diseases under Gorgas in Panama, nor for many animal diseases

offering menace to the whole country. If it were once known positively what to do, the work of State governments and their divisions would be simple and the present squandering of large appropriations secured by political and sentimental endeavor would be ended.

The Federal government is in a modest way gradually accepting its privilege in this as in other problens of public welfare. A recent investigation of California and North Carolina on tuberculosis and in Johnstown on babies' welfare exemplify its activities.

Many States and their divisions have already gathered a wealth of knowledge as a basis for this work. The Wisconsin studies of rural districts, the Minnesota work on the spread of tuberculosis in tuberculous families, the Pittsburgh Tuberculosis League work on babies, the Phipps Institute work on trades are a few of the many tasks undertaken by private agencies, but no voluntary agency can secure anything like the freedom of the Federal authority in legal or monetary resources.

Returning to the State's relation to this problem, we find that two fairly definite plans are followed.

Pennsylvania is the most prominent example of the first plan in which the State undertakes to build central sanatoria and establish local dispensaries throughout the State, bearing the expense of the whole undertaking by State tax. This seems to me wrong in principle as tuberculosis is essentially a local housing problem, requiring local intensive centers of supervision, and further we are not yet sure enough of our methods to justify wholesale expenditure on this scale for a larger State.

Massachusetts, New York, and New Jersey are examples of the second plan by which the State in more or less mandatory laws places the burden of management on its local agents of legal control, the counties and municipalities, subsidizing its agents on the basis of a proportion of the per capita expense. This plan comes nearer the economic basis for handling such universal problems of public welfare. In both State plans however, there are several fundamental weaknesses.

First. While controlling the license to practice of the medical and nursing profession, all the States have failed to realize that the control of tuberculosis cannot be handled without the proper education of these two professions in this disease. While teaching hospitals and medical schools have excluded tuberculosis from their practical work, State institutions have been placed in isolated districts and offer no opportunity to replace this lack of training. An efficient test of the knowledge of this disease should be demanded and to have a rightful position, it should form at least one-seventh of all the knowledge of the doctors and nurses.

Second. States have persistently attempted to separate tuberculosis from other social problems against all the evidence that this can in no sense be accomplished.

Third. States have forgotten that any plan for the control of consumption must be a workable plan. No plan that neglects the laws of social and color distinction is a workable plan; and no plan that fails to enforce segregation under proper conditions in jails, orphanages, hospitals, insane asylums, and other housing institutions can ever be successful.

Other faults in present State plans might be mentioned but, they are faults of ignorance which cannot be corrected.

Since none of the present plans are adequate, I would propose to you a plan which I suggested in 1910 in Philadelphia, and which I am yearly convinced is sound from the standpoint both of efficiency and economy.

This plan is based on a study of our solution of a similar universal problem presented by our educational system.

Emanating from State law there is in general established in educational work a unit equipment for a unit of population. By this equipment is gained a uniform compulsory and intensive application of the law to all concerned. The money for the expense of the care is provided by State and local taxation determined largely by the density of population and the need of the community. Those who are interested in this phase of the question would do well to read Cubberly's "Problems of State and Municipal Education."

In the educational field there has gradually developed a knowledge of the equipment necessary for a given population and this equipment has been apportioned so as to be easily accessible by those whom it is to serve. The management of these units is centered in a legally constituted governing body, which also controls the expenditure of the funds collected by taxation.

This same form of control is applicable throughout to tuberculosis and other health problems.

In the first place, our statistical studies have given us fairly accurate knowledge of where to place our equipment and what the equipment should consist of.

I should say for each 100,000 population a hospital of 200 beds, a dispensary and an open air school. Fifteen nurses of which 5 are visiting social service nurses, and 4 or 5 physicians. Such an equipment might easily expand and include all public activities, child welfare, pneumonia, syphilis, and other health and public welfare problems.

The expense should be borne as the educational expense is borne and the demand made mandatory by State law.

Large centers of population would be looked upon as but the multiplication of units of 100,000 and the equipment would be multiplied accordingly just as we now multiply our school equipment. Each unit would be self-governing but centralized in some central governing board which would establish the uniformity of the work, and the prevention of overlapping.

Dr. Goldwater, the remarkable health commissioner of New York City acting on this suggestion has attempted such a plan in that city and he reports to me that not only does it seem to be the solution of the health problem but is applicable as a solution of many of the difficulties of large city government.

There is apparently a unit of population which can be efficiently managed. When, however, we grow beyond this in number of population we cannot accomplish our care of them in any paternal way by increasing our equipment at some central place without working a hardship on the peripheral members of the community. This has been the system of government most followed in the past. In the future it seems to me the dissociation of units of equipment and the association of the heads of units will be the plan adopted in all parental work.

The State that sees fit to establish such a principle will, it seems to me, soonest reach the land of heart's desire, and will have a machinery as elastic as the problems to be dealt with, a machinery that can grow as knowledge grows and retract or reconstruct as necessity decreases, a machinery that can be used as a teaching center for doctors, nurses, and social agents and the sooner it comes the sooner will we see spelled upon the wall the doom of our present boarding houses for sick and well consumptives, and waste of effort.

We must first know, however, the right methods and I would suggest that Federal and State authorities meet and apportion different phases of the work to each other and yearly co-relate their results that we may know the sooner the efficient economic and right way of work. This I think, may best be done as I suggested above on the wards of the Federal government.

May I close with the prayer of Grotius in the conclusion of his great book, "War and Peace:" "May God write," he said, "these lessons—He who alone can—on the hearts of all those who have the affairs of Christendom in their hands. And may He give to those persons a mind fitted to understand and respect rights, human and divine, and lead them to recollect always that the ministration committed to them is no less than this, that they are the governors of man, a creature most dear to God."

DISCUSSION ON PAPER BY DR. WHITE

Lee K. Frankel, New York: It is very gratifying to me to note that in the arrangement of this program today the Chairman put on a layman. The writer of the paper is a physician; the others who have taken part in the discussion are members of the medical fraternity. It is well in discussing this subject that it should be approached not merely from the professional but from the social viewpoint as well.

To the average social worker the intervention of the State is not a new proposition. In fact, among social workers it is almost axiomatic that the State should interest itself in philanthropic and social problems. In certain States the care of the insane and of the neglected child and of the feeble minded is a State function. It is hardly worth while, therefore, at this date to discuss whether the State should enter the field of tuberculosis. Let me rather devote the time to the discussion of the lines along which the State might act.

I think it is quite safe to say that to the average social worker the present status of the tuberculosis movement is an interrogation point. Probably and with justice, the medical profession is satisfied with the splendid discoveries which it has made in tuberculosis research; we of the laity are in doubt as to the lines along which our activity should proceed. We are rather uncertain of our facts. Is tuberculosis induced largely by sputum infection, and should therefore our campaign be directed to the prevention of spitting? Or is tuberculosis an infection of early childhood preceding an immunity which prevents reinfection? Or shall we follow the latest school and trace tuberculosis, as was the belief in earlier days, to heredity? While apparently there is a definite cause for tuberculosis, namely, the bacillus,

there still seems to be much doubt and uncertainty regarding the conditions under which this germ develops.

It would seem to me, in view of this condition, that if the State is to enter the field of tuberculosis, it should plan a more definite field of work than that which has been commonly undertaken by anti-tuberculosis associations and similar movements. With the prestige and power behind the State, and which is not obtainable by any private agency, the former should carry on the experimental research to determine, if possible, the underlying social and medical conditions which control the growth and development of the tubercle bacillus.

Much has already been done in the line of medical research but oddly enough little has been attempted by individual states. The work of the Hygienic Laboratory at Washington under Federal auspices, is too well known to require elaboration at this time. Work similar to that of the Hygienic Laboratory might well be attempted under State auspices not only along medical but likewise along social lines. The latter are particularly important. We must attempt to determine, statistically, if possible, the influence that bad housing, bad living conditions, bad air, etc., have on the spread of the white plague. I have recently visited several cities in Western Canada where housing conditions apparently are good and yet I was advised that in these cities, like other cities less favored, the tuberculosis mortality is high.

The time has probably come when it is no longer within the province of private enterprises to carry on research of the kind suggested. To supply the necessary funds and to give such a State the authority which it needs, appears to me to be definitely either an enterprise of the State or of the Federal Government.

I am heartily in accord with Dr. White's suggestion to establish a certain definite unit of which a study might be made. The research work which I have in mind to be done by the State should be carried on in such a unit. No one will disagree with Dr. White's suggestion of carrying on experimental work with a certain number of individuals in a certain geographical area. The important thing to be considered is the method of carrying on such a piece of experimental research. Laboratory methods must be applied, the group isolated, its movements must be controlled, the conditions under which it lives must be guarded and studied, the principles of "spotless town" must be in the ideal. When these conditions have been made Dr. White's suggestion becomes feasible.

Dr. Isaac W. Brewer, Geneva, N. Y.: I am not in favor of "State rights," in matters of public health, when those rights are opposed to the rights of the individuals of the nation, I have had some experience with "State rights" during the twenty-seven years that I have been in the national or State service. I have labored for the prevention of tuberculosis in one community and am now doing the same for another community. Local rights and State rights are very good things, home rule is a fine thing, but in a great many cases it means home misrule. I speak with much feeling upon this subject for my work is largely to overcome the effects of home misrule upon the public health. I find myself heartily in accord with Dr. White in most subjects, and think he has presented the question to you very fully.

I believe the first thing to do in controlling tuberculosis in your own community, is to eliminate all politics from every phase of social work. Dr. Frankel said the Hygienic Laboratory has no politics in it, but I would like him to ask my friend Dr. Kenyoun. Those of you who live on the Pacific Coast remember the time when a man was found dead on the streets of San Francisco. You will remember that Dr. Kenyoun, Dr. Barker, and one other physician whose name I do not recall, investigated and pronounced the cause of death plague. However, the politicians of California declared that there was no plague in California. Now then, what was the result? Dr. Kenyoun is no longer a member of the Public Health Service. He was not discharged, it was made necessary for him to get out. The final result is that the United States Government has had to pay for California's misrule to the extent of a good many million dollars. In this city you had one case of plague and there has been plague from Seattle to Los Angeles, all because of home misrule.

If we want to get any real results in our work for the betterment of the people we must have their co-operation. We must go at it slowly and explain fully what we intend to do and why we want to do it. Often you will hear the people say that such and such things are all right but it costs too much money. You are usually up against it when you are talking with him who sees nothing but the dollar.

I believe in the people of the United States. I believe that most of them are anxious to do the right, as he or she sees it, but very many of them are inactive. You have to arouse them. In the district in which I work, the Superintendent of Schools, backed by the State Commissioner of Education, could not get a new floor nor a drinking fountain for the school. The trustee, elected by home rule, said, "It costs money: we can not get the money." So nothing was done until two children who were suspected of having tuberculosis came to the school. That stopped the drinking from the common cup; and the floor began to be looked at with suspicion, the dust was commented upon and the children began to object to the toilet. Somehow or other the children took the matter up and whenever they saw the trustee would ask, "When are we going to have a new floor, when are we going to have a drinking fountain?" They kept after him until they got them and the trustee said to the Superintendent. "Those children made me get that damned floor and that drinking fountain." That is the situation everywhere. If you want anything just keep after it and get as many others on the job as possible. The politicians want votes and they listen to those who make the most noise.

Dr. Frankel has spoken of the conditions in the rural districts of Canada. In my districts there are but two cities and they are very small ones. It is my experience that the housing conditions in the rural districts are often worse than in the large cities. There are two classes of persons living in the rural districts; the proprietors and the tenants. The former are usually thrifty and live in good homes, many of the latter are floaters and live in conditions every bit as bad as we find in the congested areas of cities. I doubt if the conditions in Canada are much different. "Familiarity breeds

contempt" and many of our health officers, living in rural communities are blind to the actual conditions or rather they ignore them.

Dr. Edward O. Otis, Boston: I think we are all agreed that the efficient prevention and control of tuberculosis in the State is beyond the power and and means of private instrumentality. In one section of the State, as in a large city, for example, a complete and intensive campaign against the disease may be instituted, while in another section but little may be done, or only spasmodically done if dependent upon private and local action. To combat the disease most successfully and economically throughout the State there should be a general, comprehensive, uniform plan of procedure directed by one central administrative body, whether it be the State Health Department or a Board of Trustees appointed for the special purpose.

There are five principal lines of attack in the tuberculosis campaign which I believe the State can best direct, aided more or less by private endeavor in local communities.

First. Education, which the State Health Board Departments have been doing to a greater or less degree for several years; by literature, traveling tuberculosis exhibitions, lectures, etc. Private tuberculosis associations can render much assistance in this direction; indeed, it seems to me that the educational propaganda is one of the main functions of such associations. In the State of Massachusetts, tuberculosis is required by law to be taught in all the secondary schools.

Second. Compulsory notification by physicians and householders, and the free examination of sputum in the State laboratory. So far as I know, nearly if not quite all the states now require the one and do the other, although many of the large cities in the country were in advance of the State in the requirement and the service.

Third. Tuberculosis dispensaries, which are either established directly by the State, as in Pennsylvania, or by the various communities under State supervision. In the State of Massachusetts each city or town of 10,000 inhabitants or over is required by law to maintain such a dispensary which must be approved by the Health Department of the State.

Fourth. State sanatoria for curable cases. In Massachusetts there are 4 such sanatoria, one of 350 beds and 3 of 150 beds each; and in 1 there is a children's department. Each patient is required to pay $4 a week, or, if he is unable to do this, the State collects the amount from the city or town from which the patient comes.

Fifth. Consumptive hospitals for advanced indigent cases. Such hospitals, in my opinion, should be local so that the patient may be near his home and friends. In Massachusetts the law provides that cities shall establish and maintain tuberculosis hospitals, which must be approved by the State Department of Health. The law also provides that towns may, and, upon the request of the State Board of Health shall, establish such hospitals. For every patient received at these hospitals the State grants a subvention of $5. Failure to comply with this law is punished by a considerable fine. The State sanatoria are under the direction and control of a Board of Trustees

appointed by the Governor, and the consumptive hospitals and dispensaries are under the general supervision of the State Health Board.

For all its tuberculosis work the State of Massachusetts is spending annually somewhat over a million dollars; and the private expenditures for the same purpose amount to over $300,000 yearly. There is now but little difficulty in obtaining from the Legislature this large yearly appropriation for the extended tuberculosis work the State has undertaken. Education has done its work. The people recognize the economic necessity of effective tuberculosis prevention and control and are willing to pay the cost.

I think we all would agree that these five lines of attack are fundamental in comprehensively dealing with the tuberculosis problem, and that they can best be effected with a continuity of purpose under State authority and control. The State has power to command and enforce obedience; and one directing body can most effectively coördinate and systematize the various kinds of tuberculosis work. Moreover, the State is in the position to obtain the requisite means when it has once awakened to the importance of the problem as an economic measure.

The especial methods which the State should employ in carrying out this work will naturally differ under differing conditions. Large cities, for example, can generally be left to themselves to deal efficiently with their local tuberculosis problem, as New York and Boston are doing. In the agricultural states certain sections, as counties, can unite in providing accommodations in consumptive hospitals for their advanced cases. In sparsely settled areas there might be some method of medical inspection by a visiting physician, in place of a dispensary.

Each State must work out its own method of conducting its campaign, keeping in view the cardinal objects to be attained: Education, opportunity for the examination of suspected cases, and provision for active cases of the disease, either in the curable or advanced stage; in any case, it is essential that there should be a State administrative body to direct and supervise the work, and with ample power to enforce its decrees. When the people of the State once recognize the extreme importance of controlling tuberculosis, as an economic as well as a health measure, sufficient appropriations for the purpose will be forthcoming; they will realize that public "health is purchasable" and pays a good rate of interest.

THE OFFICIAL RESPONSIBILITY OF THE CITY IN THE TUBERCULOSIS PROBLEM

By Theodore B. Sachs, M.D.

Chicago

In a systematic effort toward gradual elimination of sources of tuberculous infection, a municipality is confronted with a number of factors, geographically or legally outside of the domain of municipal control. The very sphere of municipal control is dependent upon State legislation; the control of some factors lies, by their nature, within the exclusive authority of the State and the control of others calls for co-operative arrangements between the State, county, and city.

The factors, within the control of the State are: (1) Enabling legislation permitting a broad sphere of municipal control of the disease, through all the necessary administrative and institutional arrangements; (2) Advancement, if necessary, of such municipal or county administrative and institutional control of the disease, by State subsidy or special tax; (3) Measures insuring a milk supply free from tubercle bacilli, before the milk reaches the limits of the municipality; (4) Statewide educational campaign bearing on prevention of the disease; (5) State legislation bearing on conditions of labor responsible for prevalence of tuberculosis.

RESPONSIBILITY OF A MUNICIPALITY IN THE CONTROL OF TUBERCULOSIS

One of the fundamental functions of a municipality is protection of health of its citizens. The recognition of the importance of this function is finding expression in the steady progress of our municipal health departments, from mere bureaucratic offices, poorly financed and inefficiently managed, with the narrow functions of "issuing permits," "abolishing" flagrant nuisances, and "recording" mortalities to real health departments, well financed and efficiently managed to fulfill the great function of promoting health and preventing disease.

Among the various phases of the municipal health problem, tuberculosis is naturally receiving growing recognition because of its widespread prevalence its large number of deaths, representing about one-tenth of the entire mortality (one-third of the deaths occurring at the most productive period of life), a morbidity of various degree affecting at least 1 per cent. and latent infection impairing the health and working power of at least 10 per cent. of the population, the baneful influence on the general health standards and the resulting great economic loss.

The trend everywhere is toward gradual supplanting of the pioneer enthusiastic work of private anti-tuberculosis organizations by the more comprehensive, more correlated system of control of the disease by efficient municipal health departments.

In this period of gradual change from private effort to municipal action, the time is most opportune for formulation of standards and right scope of municipal activities in the matter of control of this most widespread disease.

THE SCOPE OF RESPONSIBILITY OF A MUNICIPALITY IN THE CONTROL OF TUBERCULOSIS

In the last two decades the scope of work of municipal health departments has grown in proportion to the gradual recognition of health as an important communal problem. The progress has been against many difficulties still existent. Chief of these are a part of the old order of things, in which municipal health officers occupied a subsidiary position, with many of their functions distributed among other departments of the city government. Constant opposition is being also manifested to the further expansion of control over conditions which the enlightened judgment of communities tends to place within the domain of municipal regulation.

With our present experience with the health situation in municipalities of this country, it is evident that efficiency calls for concentration of effort and authority.

Tuberculosis is a communicable disease and its regulation in a city should be absolutely within the domain of the health department. The problem of this, as well as other diseases, is, however, so interwoven with other conditions as to necessitate additional arrangements by which the health department may be a factor in the final decision of all municipal problems directly or indirectly affecting health.

Under this heading should be mentioned the following: (1) hygiene of streets and alleys; (2) freedom of air from smoke and dust; (3) extent of vacant space, including parks, playgrounds and space between buildings; (4) the health requirements in the architectural arrangements of homes, public buildings, schools and working places; (5) systematic supervision of health of school children.

The direct regulation of the disease itself, in the light of present experience, calls for: (1) notification of all cases of tuberculosis; (2) disinfection and renovation of infected premises; (3) dispensary control of all cases in their homes; (4) institutional provision including hospitals, sanatoria and open air schools; (5) a campaign of education on prevention of the disease.

It is apparent that the control of the entire tuberculosis situation, because of the communicable character of the disease and in the interest of efficiency, should be vested in a city in its health department, with sufficient funds and machinery to control the situation.

THE PARTICIPATION OF CITY HEALTH DEPARTMENTS IN THE CONTROL OF GENERAL CONDITIONS RESPONSIBLE FOR PREVALENCE OF TUBERCULOSIS

It is apparent that the city tuberculosis problem can never be solved without the gradual eradication of all such general factors in the city environment which undermine resistance and favor infection.

Pollution of air, cleanliness of streets and alleys, hygiene of public places and conveyances, adequate provision of light and air in buildings, overcrowding, school environment—all these factors are at present, in nearly all cities of this country, almost totally outside of even partial control by health departments.

Grave considerations of communal welfare demand an arrangement by which municipal health officers may not only exercise a controlling influence over the health requirements in the solution of all the above problems, but also have a well defined right of initiative in the suppression of conditions contributing to the prevalence of the disease.

It is apparent that with further enlightenment on all matters of health the authority of health officers in such matters will materially increase.

Efficient control of tuberculosis by city health departments necessitates the exercise of such authority.

SUPERVISION OF HEALTH OF SCHOOL CHILDREN

Supervision of health of school children is naturally one of the most important factors in the municipal control of tuberculosis. Two important features of this problem are engaging the attention all over the country; efficiency calls for their gradual solution.

One is the division of responsibility, at present in existence in many cities of this country, in the matter of systematic supervision of health of school children, with the view of control of communicable disease and advancement of higher health standards. The control of hygiene of school buildings is inseparably linked with this important function. Considerations of efficiency demand centralization of authority, either under a special bureau, with equal representation of the Board of Education and the Municipal Department of Health, or, the authority should be absolutely vested in the Health Department.

Another important feature of the present situation is the lack of system and the inadequacy of the medical examinations of school children as conducted at present. The control of the standard of health of school children demands a system of thorough medical examinations, before entrance and at beginning of each school year, as well as a system of subsequent close supervision coupled with periodic re-examinations.

Centralization of authority and greater efficiency of the present system of supervision are the two important problems to be solved in order to make the present system of school health work an important factor in the gradual eradication of tuberculosis.

COMPULSORY NOTIFICATION OF CASES OF TUBERCULOSIS

Following the initiative of Dr. Herman L. Biggs in establishing compulsory notification of tuberculosis cases in New York, the policy has been adopted and is in force in a number of cities of this country, with a variable degree of success, the proportion of living cases reported ranging at present from up to 90 per cent. of reported deaths to 80 per cent. of total number of living active cases (Manhattan).

Enforcement of ordinances requiring notification has, however, only an educational influence unless it is connected with efficient supervision and control of all cases so reported. The work falls within the province of tuberculosis bureaus of city health departments.

DISINFECTION OF INFECTED PREMISES

The object of disinfection is the destruction of all the infective material on premises formerly occupied by a case of communicable disease. This function is inherently within the domain of the Health Department. At best it is performed at present, in the vast majority of municipalities, in an incomplete way, with the results short of the object sought.

Actual elimination of infective material from premises calls for efficient disinfection coupled with thorough vigilance and thorough co-operation between the Health Department, the medical profession, the landlord and the general public. It requires sufficient funds for efficient work.

The municipal tuberculosis dispensary system, with its corps of physicians and nurses, is an important factor in the situation.

As in all matters pertaining to the control of tuberculosis, unification of effort is of vast importance.

DISPENSARY CONTROL OF TUBERCULOSIS CASES

The tuberculosis dispensary system, developed in this country, under the leadership of the National Association for the Study and Prevention of Tuberculosis, is at present one of the greatest factors in the control of tuberculosis in various communities. The American dispensary system, as it stands at present, is noteworthy for its gradual extension of control over the entire environment of the consumptive, including his family and all contacts.

The immense system at present in operation, has grown out of the effort of private anti-tuberculosis organizations. The tendency of the last few years has been toward gradual assumption of this function by State and municipal health departments where it rightfully belongs. We are now in a transitory period, impeded on one hand by the unwillingness of less enlightened communities to assume municipal control, and confronted on the other hand, with the lack of system and centralization of effort due to dual or multiple management.

Municipalization of the entire tuberculosis dispensary system in every city, with further development of all arrangements for early diagnosis and efficient control, is of utmost importance to the gradual eradication of tuberculosis in our communities.

INSTITUTIONAL PROVISION FOR THE CARE OF TUBERCULOSIS IN MUNICIPALITIES

The hospital system, for the treatment of advanced cases, has grown in this country out of the initiative of religious and private charity organizations. Most of the county tuberculosis institutional provision developed as a part of the country infirmary or poorhouse system. On the other hand, in the last 30 years, since the foundation of the Adirondack Cottage Sanatorium by Dr. Edward L. Trudeau, a rapidly growing sanatorium system came into existence, partially under private, partially under State, county or city auspices, chiefly for the treatment of curable cases.

With the recognition of importance of tuberculosis in children, came preventoria, still in their incipiency.

Inadequacy of the existing institutional provision to meet the requirements of the situation, is intensely felt even in the most progressive communities. Poorhouse methods still characterize the work of most of the county institutions, the spirit of leadership and tendency to progress being still limited to private sanatoria and hospitals or to a comparatively small number of State, county and city institutions built or developed in the course of the national anti-tuberculosis campaign of the last two or three decades.

Among the most palpable defects of the present institutional provision in most of the communities are the following: (1) lack of cohesion between the work of various institutions in the admission, care and after care of their patients; (2) lack of co-operation between the hospitals, sanatorium and dispensary systems; (3) lack of co-operation between the institutions and the health department in whom is vested the function of controlling communicable disease.

This dissociation of effort is a great impediment to efficient control of tuberculosis.

It is apparent that in cities with sufficiently large population, the Health Department must have complete control of the entire hospital, sanatorium and dispensary provision, with an additional arrangement in operation, by which all private institutions should become a co-operative factor in a unified and centralized system having for its object control and prevention of the disease.

It is very important that with this centralization of effort in the municipal health department, progress shall continue along lines of medical and administrative efficiency, unhampered by outside considerations.

CAMPAIGN OF EDUCATION ON PREVENTION OF DISEASE

Health standards are largely a matter of education. Efficient administrative arrangements for prevention and control of disease are impossible without recognition on the part of the community of the importance of the problem, of its causative factors, its relation to general welfare and its methods of prevention. Efficient control of disease can not be attained without full co-operation of all elements in the community. The personal attitude of every

citizen, in the matters of health, is of tremendous importance in the attainment of higher communal health standards and in the efficient enforcement of all regulations enacted with that point in view.

In the last two decades, an educational campaign on tuberculosis and the factors involved in its causation and prevention, has been persistently carried on, chiefly by private anti-tuberculosis organizations. The country at large, no doubt, has more information concerning tuberculosis than any other disease. The information, however, is still rudimentary and is interwoven with a mass of misconceptions.

The lessons taught are frequently at variance with the attitude of the general practitioner and the policy pursued by local health departments. There is a great need of further spread of exact knowledge and adjustment of views by well directed methods of discussion and publicity.

The leadership in a widespread rational and effective educational campaign on tuberculosis must eventually be vested in health departments backed by enlightened medical profession and the people at large. The lesson must be carried to the people by means of all well tried methods including lectures, conferences, exhibits, etc.

CONCLUSION

In the further development of the present arrangement for the control of tuberculosis, municipal health departments must gather strength, be given funds and acquire the support of the medical profession and the people at large, in directing a campaign against this most widespread disease of modern times. Efficiency calls for united effort with centralization of authority. The spirit that made possible the country wide effort of private organization must finally find its expression in the enthusiastic support given to modern health departments in full accord with their enlightened communities.

DISCUSSION ON PAPER BY DR. SACHS

Ernest D. Easton, Newark, N. J.: I do not think any of us will question but that the State should have some control over the municipalities. Just how much is perhaps a debatable question.

The first important thing to decide upon is what is the logical unit of control, the city, county, or State. Most of us will probably say that the county is the logical unit. New Jersey has copied New York's example and decided that we ought to have county hospitals, and we have a law making it mandatory that every county shall have such a hospital. We have a law, also, making it possible that patients may be taken from their homes and sent to county hospitals in case they are dangerous to the community in which they live. The question arises, however: What is the difference between the theoretical unit and the practical unit? We have in the county in which I live a county hospital; we also have a municipal hospital belonging to the city of Newark. A short time ago the city of Newark thought that it would give up its local hospital but some of the people interested came to me and

wanted to know what I thought about it. I drew up a brief which was sent to the Mayor and which was somewhat to this effect:

"Are you willing to give up your hospital and turn over the work to the county? I admit that the city is paying seven-eighths of the taxes for the county hospital; therefore, I suppose that the city ought to get more of the benefit out of this county hospital than it does at present especially if it continues its own local hospital. But are you willing to admit that the board of freeholders have any interest at all in health matters; are you willing to submit the health of your community to a body of politicians who want to spend money and who somehow or other have the ability to get money from the state; are you willing to submit this work to the freeholders? Then, you must also be willing to submit, probably, the work of the clinics, because I do not see how a hospital can be a real hospital without its own clinics and probably without its own corps of nurses, and going with that you must have your educational system. Therefore, if you are willing to admit that the county can take over this work, have its corps of nurses, have its day and night clinics, and can do this work satisfactorily, I am willing that you should turn over this work completely to the county and give up the local institution."

The Mayor saw the force of the argument and did not think that the city was quite ready, at any rate at this stage of the game, to surrender complete control. Consequently, the Common Council voted not only to continue the hospital, but to increase the number of patients that it can accommodate and increase the number of nurses that will work in connection with the clinics and with the patients.

I do not know that this is the best solution, but it seems to me that it does prove one thing, that the city is closer to the people, can have more authority over them, can accomplish more with them, than the county, though the county, in some respects is over the city and yet, in other respects, is under the city. The logical thing, it seems to me, is, especially in Newark and in New Jersey, to continue the municipal health bodies, let them have control of this disease, but also to make use of a law which we now have in New Jersey giving the health inspectors of the State authority to go into any municipality and say, "If you don't keep up your health conditions to a certain standard, the State will step in and see that you do keep them up to that standard." In other words, there must be a standard, below which no municipality can fall. The State has an interest in its citizens and if the State sees that that standard which is set, is kept up, it will undoubtedly do much to maintain the health of the community.

Dr. Alfred Meyer, New York: I think that though I am assigned to the topic of the relation of the municipality, to this great question, it is almost impossible not to cross the borderline, even at the risk of being treated like the western cattle and being rounded up by the united effort, perhaps, in my case, of both the Chairman and the Secretary. Because tuberculosis has no city limits, it has no county limits, no State nor national nor international limits, whenever the question is discussed we are very apt to be influenced largely by the aspect of the question with which we are ourselves dealing in our daily life. However, there is one fundamental thing underlying the con-

sideration of this question from the point of view of all these political units, and I am sorry to say, as a physician, that that underlying thing which has not yet been solved is a medical question. In the beginning of the discussion, we heard Dr. Frankel say that the public is looking to the medical profession for guidance on a number of questions. Speaking for my profession, I must thank him for the implied compliment. Unfortunately, doctors are only human beings; some say, inhuman ones. I do not accept that definition. They cannot answer all the questions put to them.

One of the important, the second important question underlying the whole matter is: What is predisposition to tuberculosis? The world has accepted Koch's view, that the cause of the disease is a micro-organism with which we are all more or less familiar. There has not yet arisen in this world a physician who has been able to answer the second question, what is predisposition? A celebrated French author some years ago very wisely said, "The word 'predisposition' is a word to hide our ignorance." My personal impression, and I think probably that of all of you, is that that definition is a little too severe, because it is generally accepted that we know some of the predisposing causes; but there remains one, and perhaps the most important point, yet to be discovered, which will guide us, perhaps, in the final solution of the question. But up to the present time, we really have not decided what is predisposition to tuberculosis, in spite of all the work which has been done on the improvement of general hygiene of cities and the attempt to increase the vitality of the individual along a great many lines.

My personal experience with the disease has been acquired in a community with which you are acquainted, the city of New York. Now, it seems to me that that has taught me a lesson which has been emphasized by what I have seen on my first trip west of Colorado. It seems to me that whatever method is finally adopted for the control of this disease, it will have to be modified according to the community in which you live. Would any of you think it reasonable to apply the same practical measures on the prairies of South Dakota and North Dakota and of that endless State, Montana, through which I thought I would never completely pass, and your own wonderful State of Washington, that you apply to the community wherein my lot is cast? We had in New York City, in 1913, 29,000 cases of pulmonary tuberculosis registered with the Health Department. Last year, we had 32,000—I am giving you round numbers—registered on our Health Department books. So that to deal with that problem in the same picayune way, or say way—I do not want to make any derogatory remarks in regard to the vast territory I have traversed, but I do want to put it to you in a pregnant way how differently we must deal with the problem in the city of New York and in the territory of which I have just spoken.

There are, however, general points. One thing that may be done in the western States is the union of counties. It would not do in New York State. It also seems to me to be a wise thing for each State to establish one sanatorium, at least, for incipient and presumably hopeful cases and one sanatorium, at least, for the advanced cases, merely as an educational exhibit and then to hope that the average intelligence and the average generosity of the taxpayers

throughout the State will come up to the point of following that example. That was the method followed in my own State. A number of us in New York State, who were responsible for the general educational movement there said right at the start, "We will imitate Massachusetts in the direction of establishing one State sanatorium." We know that Massachusetts in this, as in so many other great causes in our nation, has been a wonderful leader. I need only refer to the stand taken for the abolition of slavery and for civil service reform; you can multiply the examples. New York was a good follower. One State sanatorium is now in existence in the Adirondacks as an example to any city, to any county that will have the intelligence and the generosity to follow it. It seems to me that ultimately the money to establish multiples of that unit should come from the smaller political units. Chicago presents a problem like that of New York and the Chicago taxpayer has a better chance to oversee the expenditure of his appropriation and to supervise the spending of that money than if it were under State control. And I certainly think that that method of example by the State, imitated by the other political units to the extent of their civilization is perhaps applicable to every one of the States of the Union, with some modification according to the number of population, and other conditions, and the purse that makes the mare go and which helps us so much in the work. I have gone through seven new States in the last few days and I realize that conditions vary.

There are a few points in Dr. Sachs' very splendid paper that perhaps I should like to refer to in detail. I agree with him that the trend of the anti-tuberculosis work in the great cities is in the direction of control by health departments. I agree very strongly with him that particularly the working out of the local details must be left in the hands of that department having charge over—I will avoid the words "infectious diseases" and will rather say, "communicable diseases," because I think it is a mistake to class tuberculosis as an infectious disease.

Now let me picture to you the unfortunate situation in New York city. The work in New York city is controlled by three great departments. I should mention the Charities Department first, because it has the largest number of cases under its control. The latter is controlled secondarily by the Health Department; and thirdly, by the Bellevue and Allied Hospitals. Now a committee, of which I am Chairman, has been trying for three years to get a unification of control and we have finally reached the point of bringing in an official report, which was accepted by the Sanatorium Committee, to the effect that we believe, in the interest of the work in our community, the Health Department should have full control. Dr. Goldwater, our commissioner, has expressed his willingness to accept, though very reluctantly on account of his many other duties, the burden of this responsibility. The Charities Commissioner, with the largest number of cases under his control, has yet to be won over. Now, when we have unification of control, I may be able to tell you results, if I live long enough, at some future meeting.

Just one word more! I do hope that whatever is done in the way of accepting or modifying any of the suggestions we have heard here today that it will never curtail the efforts of such organizations as we represent, because I be-

lieve that in our system of government one of the most beautiful things we have is the voluntary efforts of the people in guiding and controlling the political units, small and large, in any large endeavor and finally the union of such organizations with the governing bodies, the marvelous success of which is exemplified by such things as the Botanical Garden, the Zoölogical Garden, the Museum of Natural History and others in New York.

THE OFFICIAL RESPONSIBILITY OF THE COUNTY IN THE TUBERCULOSIS PROBLEM

By George J. Nelbach

New York

The last 6 years have witnessed a steadily growing conviction, intensified by experience, that the county as a political unit has a very important role in the tuberculosis movement. The problem is so immense, the cost of dealing with it on an adequate scale so great and the allied problems involved so fundamental that it will undoubtedly make strong demands upon all of our civic machinery.

The State, which is generally speaking the most efficient administrative unit, has its share to do. In my opinion its function is to carry on the campaign of popular education, to enact needed laws empowering the local communities to do their work, to see that they adopt constructive measures of relief, control, and prevention, to see that the duties imposed upon these localities are adequately and effectively performed.

But for the work which is most actively engaging our attention at the present time and which constitutes the direct attack upon the disease a less extensive unit than the State is needed. This work, no State in the union excepting Pennsylvania and the very small ones such as Rhode Island and Delaware, has undertaken on a State basis. The strong lessons of experience indicate that the most practical way of carrying on this direct attack is to organize it on a local foundation and so the county has come to be regarded as substantially the most practical political subdivision of the State to cope with the problem.

The city of course has its share. As compared with the county the city is usually the more efficient administrative agency but the number of cities large enough to deal with the problem independently is comparatively small. The great bulk of the population of this country is gathered in townships, villages, and cities too small to take up this work themselves. The responsibility of the county is therefore primary.

In the direct attack on the problem, hospital segregation, especially of the moderately and far advanced cases, though strongly challenged in some quarters, notably by a group in England, is still regarded by the preponderance of opinion as the single most important weapon. The cost of construction and of maintenance of tuberculosis hospitals is considerable, and the difficulty of securing adequate appropriations from State funds for a system of State hospitals is such that some form of local provision has had to be worked out. Moreover, under a State system of hospital control there is considerable doubt whether the State would locate its institutions so that they would be readily accessible for the patients and their relatives and friends. Far ad-

vanced cases cannot, and many others will not, go far from home for care and treatment. Excepting the cities large enough to deal with the problem themselves, the county seems to be the most practical local unit for hospital control, for then the patients in the remote rural sections, in the hamlets and villages, as well as in the cities are provided for. Laws imposing upon the counties the responsibility of providing hospital care for the tuberculous have been enacted by 13 States—New York, Illinois, Ohio, Wisconsin, Minnesota, Indiana, Missouri, Iowa, Michigan, Washington, New Jersey, Kentucky, and Texas—while at the conference recently called in Maryland by the Governor of that State, it was decided to draft and present to the next legislature a bill providing for county hospitals, and indeed in Alabama a bill for county hospitals has been drafted and will be introduced in the legislature in July. Further evidence that the subject of hospital control of the tuberculous is regarded as one of local and not State responsibility is afforded in the case of Massachusetts—the pioneer in so many matters affecting social and civic welfare. That commonwealth originally provided 4 large State institutions but about 4 years ago enacted a law providing that the towns shall provide the tuberculosis hospitals, the town and not the county being selected as the local unit because, generally speaking, the town is well populated and has greater prestige under the New England form of government than the county.

As to institutional provision *for incipient cases*, there is much to commend in the plan of State care, including the desirability of change of climate from some portions of the State, the greater efficiency of the State as an administrator, and the fact that the number of incipient cases recognized is usually small. But there is considerable danger of confusion in the minds of public authorities as to the relative importance between providing State care for the incipient cases and institutional provision for the others. When it comes to choosing between the two, the establishment of State sanatoria should yield precedence. The sanatoria for incipient cases have had very little, if any, effect upon the real problem, that of diminishing infection, and in some States their establishment, and in others proposals to establish them, have actually delayed the more serious and fruitful attack upon the disease.

In the provision of a series of county hospitals there is of course the possibility that some may be unwisely located, poorly planned, and inefficiently administered. In this connection the State, in enacting the statute providing for county hospitals, should clearly define how the institutions are to be established and conducted, and focus responsibility for their management and administration. It should reserve to itself authority through its health department to approve sites, plans, and location of buildings, and to inspect and supervise the operation of the institutions. The statute should provide for the complete separation of the hospital from pauper institutions and from the administration of poor law officials. To my mind, the statute should be permissive, not mandatory. Public authorities resent mandatory legislation and are very resourceful in postponing taking the decisive action contemplated by the statute.

Counties too small to have hospitals of their own may be permitted with the approval of the State health department to combine in the joint establishment

of a hospital. Those counties having very large areas and sparse populations and inadequate or no general hospital facilities whatever, may find it more advantageous to establish general hospitals with tuberculosis divisions than to combine with other counties in the establishment of a special tuberculosis hospital.

Considerable difficulty has been experienced recently in inducing the counties to provide the needed institutions. The cost of public administration has gone up with the cost of living. Taxes are higher and getting higher. In many cases the county authorities, fearful of increasing the tax rate, have not felt disposed to provide the funds needed for the establishment of hospitals. In some States this disposition to hold back in the traces has been overcome through the provision of a State subsidy; in others by an amendment to the statute authorizing the county authorities to submit the hospital proposition to the vote of the electors. While in some quarters there seems to be some objection to the economic advisability of the State subsidy, the plan, nevertheless, has two distinct advantages; it does away with undue delay in the provision of hospital care; and it gives to the State a powerful lever with which to enforce satisfactory standards of administrative efficiency, the granting of the subsidy being conditioned upon the maintenance of proper standards.

The utility of the referendum plan for the establishment of hospitals was demonstrated in New York at the general elections last November. Four counties took advantage of the amendment to the county hospital statute enacted by the legislature of 1914 and providing for the referendum method of securing funds for hospital provision. In spite of the untoward business conditions and the uncertainty as to the effect the great European war would have upon business and employment, and in spite of high taxes, the electors returned decisive majorities for the hospital proposition in three of the counties. In the fourth county the proposition was carried by a majority of only 157. This small majority was due to the fact that both factions of the dominant political party were strongly opposed to the hospital proposition and fought it with all their resourcefulness. In a number of instances electors who were not taxpayers failed to receive the hospital ballots though they demanded them and were authorized by law to vote on the question. All 4 counties were distinctly rural in character. Only one had a city, and a small one at that—8000 population.

In New York, of late years the referendum method of political action had fallen somewhat into disrepute because only a minority of the voters had availed themselves of the opportunity of expression. This was especially true of referenda on propositions amending the State and federal constitutions. It is interesting to note, however, that upon this human life question substantially as many persons in these counties voted either for or against the hospital proposition as voted for the candidates for Governor.

The following table gives some interesting statistics on these 4 hospital referenda in New York:

Name of County	Population (Federal Census 1910)	Average Annual No. Tub. Deaths	Vote For Hospital	Vote Against Hospital	Majority For Hospital	Total Vote on Hospital	Total Vote on Governor
Lewis.....	24,849	17	2,803	2,157	646	4,960	4,992
Chenango.....	35,575	27	4,919	2,949	1,970	7,868	7,958
Suffolk.....	96,138	88	9,525	7,226	2,299	16,751	18,651
Nassau.....	83,930	78	6,798	6,641	157	13,439	16,299

The county, in my opinion, has other important responsibilities in the tuberculosis movement besides that with respect to hospital provision.

I favor making the *county hospital the centre* of the organized movement against tuberculosis within the county. I must admit that I know of no county in any State in the union in which that is done, though the trend is toward that plan in several counties of New York. In the interest of efficiency I think the county should itself, *through its hospital*, provide the necessary machinery for the discovery and diagnosis of cases, for the sanitary and medical supervision through dispensaries and visiting nurses of such patients as cannot or will not for one reason or another go to a hospital. The county hospital should also carry on a campaign of popular education, supplementing that of the State, rather than look to the several cities, towns, and villages to take up and carry on these lines of work themselves. This conception of the wider development of the hospital's function has much to commend it. For the uncertainties of co-operation and co-ordination on the part of the political sub-divisions of the county, it substitutes the single administrative control of the county itself. Moreover, it is quite likely to lead to a much more satisfactory management and administration of the hospital itself. Medical men say that there is probably nothing in the practice of medicine so uninteresting and deadening as the treatment of advanced cases of tuberculosis. It would seem that a much higher grade of medical superintendent could be secured for a county hospital if he had the duty and opportunity of organizing this extremely interesting work of extending the hospital's influence out into all parts of the county. It is also probable that a more interested and active board of managers could be secured with this newer conception of the hospital function.

In one regard I would make an exception to this. I think the physicians should continue reporting their cases to the local health authorities. The doctors report their communicable diseases to the local health officer and they have been getting more and more in the habit of reporting to him their cases of tuberculosis. To require them to do otherwise would probably lead to confusion. It is simpler to have the local health officers refer the *reported* cases of tuberculosis to the county hospital.

The natural leaders in all this extension work: in the establishment and maintenance of clinics and of a staff of visiting nurses; in the development of after care; in the study of local conditions affecting the development of tuberculosis; and in the constant education of the community in regard to tuberculosis and its treatment and prevention, are the superintendents and mana-

gers of the hospitals. They are constantly in contact with the subject. They see it in all its phases. They know many of their patients over a considerable period of time, and have the opportunity to study the subject in all its bearings. True, they have serious responsibilities in securing the smooth and efficient operation of the hospitals. Nevertheless, I am strongly of the opinion that they should add thereto the leadership and direction, from start to finish, of the movement against tuberculosis in the county. Single administrative control means increased efficiency and that is what is needed in the tuberculosis movement as in every line of civic, social or business activity. It may be urged that the politicians would find it easier to seize hold of such single administrative control than of the health administration in the several cities, townships and villages of the county. But that danger, I am confident, is becoming less and less each year. In a number of states the people have declared recently in unmistakable terms that they want public health, are willing to be taxed for it, and will brook no political interference with its administration. The tuberculosis movement is in most places the best organized phase of the public health campaign, and one of the duties of the voluntary organizations is to safeguard the public tuberculosis agencies from the blighting effect of sinister politics, and to hold up to a high sense of duty those charged with official responsibility. I am confident that the State and local associations, supported by a steadily increasing public sentiment, will be able to keep the tuberculosis movement out of the hands of political manipulators.

Up to a few years ago the county as a local governmental unit was somewhat neglected. More recently, however, substantial improvements in the administration of county affairs have been effected and a higher grade both of organization and administration has been reached. The trend now is decidedly up grade. The county is taking on more and more lines of social welfare work, such as probation, general hospital care completely separate and distinct from pauper relief, care of dependent children, and health work through full time health officers. To develop our tuberculosis campaign with the county as an administrator, is not only in line with expediency but is decidedly in consonance with the trend of local governmental evolution.

DISCUSSION ON PAPER BY MR. NELBACH

Miss Bethesda I. Beals, Seattle: It is difficult to discuss a paper so thoroughly in harmony, as a whole, with one's own views. One phase of the work which I consider especially necessary in any adequate scheme for controlling tuberculosis, and, very vital in any plan for county control, is development of the visiting nurse work. In no paper that I have heard has there ever been emphasized satisfactorily to me this division of the work. I think that we do not talk enough about the visiting nurse and what she accomplishes. I know that our efforts here in Washington have been far more productive of results when supplemented by the visiting nurse. You may have your machinery and you may have a mandatory law that does not "mand," but if you have a good visiting nurse in the field, you need not worry so much, because she will be looking after the interests of the association and of the

tuberculosis question about twenty-three and a half hours out of the twenty-four, which is a pretty good record.

In the county control of tuberculosis, there is also another point which might be further emphasized. One, the educational campaign, has been mentioned. A thoroughly intensive campaign with motion pictures or other exhibit, making sure to include the school children, will do wonders in crystallizing public interest and securing action for the control of the disease in any county. Stereopticon slides may be used, should there be no motion pictures house or electricity in a community. The county superintendent of schools is usually most willing to co-operate, and often the places most difficult to reach may be reached through his assistance. There is a great opportunity, too, in the educational work to make our motive clear, and to show that our ideals and standards are far above partisan politics, or sectarian religion. Establish these points in the minds of your public, and I think you will find, as we have here, that partisan politics are a small factor in the establishment of county institutions. There are few counties, very few, where I know personally the politics of the Board of County Commissioners, or where I care to know. I think we tuberculosis workers should be rather cautious about handling that word "politics" as if a term of reproach. You all know there are times when we ourselves must go into politics a bit; therefore, we should not blame the other fellow if he does. And though the motives may be different, the methods are much the same, and victory is sweet and defeat equally bitter to each. I wonder how much tuberculosis legislation would be on our statute books today without the aid of some of these so-called "politicians" whom we have interested in our cause. I feel that the politician of the cartoons is a rather rare bird, and if you scratch deeply enough the average man holding a political position is a pretty good sort after all. We have found them so with us.

The visiting nurse, as a part of the educational campaign, has a direct bearing on your political question too. In going over the county and presenting an absolutely impartial, unbiased attitude toward everyone, she is a great power in focusing public attention on the work. When she is employed, as she is in our counties, by the county commissioners—who are given that authority in our law just as they are given the authority to establish the hospitals—and is given the extension work of the hospital, it is working out, I believe, Mr. Nelbach's idea that the institution should practically be the center of the tuberculosis activities of the country. I am glad to state that in the counties having tuberculosis hospitals, the nurses are doing a most valuable work in first, finding the case and putting it in the hospital, and then following it up after dismissal. The nurse never loses touch with the family or the patient, and in this way the patient is often kept on the road to health instead of coming back to be a patient again—often a charge—and incapacitated from wage-earning.

In this State, we have arranged for the coming year for a visiting nurse for the entire State, who will encourage the county commissioners to develop the work in their respective counties; who will help the nurses already at work to unify and standardize their reports so they will be available for statistics;

whose reports will help us to direct and enlarge the work in the various counties, and who will assist us in getting the best results. I think if we develop along that line we shall get further than if we attempt to make institutional provision in a locality before the nurse has made a survey.

My idea for the organization of county tuberculosis work, is an extensive educational campaign first, followed quickly by the employment of the visiting nurse. Then I would conduct an intensive educational crusade with her assistance. Later, the establishment of the clinic and the hospital will be possible. One of my serious objections to joint hospitals is the difficulty of placing responsibility through divided authority, thus materially decreasing the possibility of developing the work as a local unit.

Robert J. Newton, Austin, Tex.: As far as I am concerned, I did not see this paper prior to its reading and I will not say that the author has "Wilsonized" it at all. He talked with me about it at the breakfast table this morning and I found that I agreed with him on everything that he said; I want to go on record, "Them's my sentiments." But when a man from Texas is up against something to talk about, he talks about Texas, as a rule. Dr. Meyer said that he thought he never would get through Montana; well, if he were going through Texas, he would not want to get through it. Texas is different from other States in many ways; for instance, we have a very peculiar disease there. One of the reports filed with the Board of Health gave a cause of death, which was quite a shock to a public health service surgeon who was going over the records. The cause of death was given as "Horse Thief."

It is a pleasure to me to find that in Texas we are doing some of the things the Chairman has outlined. I went into the State four years ago and began doing anti-tuberculosis work, and soon found that Texas is up against a bigger problem than is realized. A doctor would not go into rural counties there and specialize and it was hard for us to secure a specialized institution such as a county tuberculosis hospital. We succeeded only in the city of Dallas, where we got a county and a city tuberculosis institution. In the other places, they would not listen to us. We have less than ten counties with a population of a hundred thousand in Texas. We have counties with much less population; one has a population of sixty-five people. Now, it is rather foolish, it seems to me, to talk about county tuberculosis hospitals in such communities. Seventy-five per cent. of our population is rural. So after ascertaining the situation and the needs, we prepared a law which permits any county to establish a general county hospital, and we sought to make it mandatory. There is an advantage to that in one way. Very rarely, you meet with a county official who is really concerned about such matters and who wants to establish a hospital, and if he can fall back on a state law and say that he has to do it, it really helps him with his people. That point came out in San Antonio, where the authorities wished to establish a hospital, and the people, thinking that they had to vote a bond issue, did so. Under this law today, six of our two hundred and fifty counties have provided county hospitals. Three of these are open and operating. We require in the law that counties having a city with ten thousand population or more must provide separate buildings for the care of tuberculosis, also another separate building

for the care of contagious diseases. They must provide separate rooms and wards for maternity cases and for the temporary care of the insane. A board of five managers has charge of the institution after it is built as under the general law the county commissioners have charge of the expenditure of all county funds. In some counties they have called in an advisory board of citizens to aid in locating the site and securing the plans. The board of hospital managers are permitted to open a free dispensary in connection with the hospital and in other cities of the county. They may also employ visiting nurses to work from the hospital and from the dispensaries and to do educational work. The managers are also permitted to establish and maintain an open-air school. So you see we are able to establish a complete institution which can become the center of public health work in that county. The plan is working out. The law has been declared constitutional, there is no danger from that standpoint; as you know, most of our good laws are found to be unconstitutional.

When you consider that we have two hundred and fifty counties in the State and only six hospitals secured thus far in two years, it seems rather discouraging, but, on the other hand, you all know, something about the cotton situation. The people of the south could not sell their cotton this year and it is a very poor time to talk bond issues to them. Several counties postponed their bond issue elections and we have not been urging that side of the question very actively for the last six months or more. Another point: Texas is a new State in many ways, many of the counties are building roads, they are building schoolhouses, they are building courthouses, and it is just one bond issue after another, as one man told me only he emphasized it a little bit. But we will keep at work along that line.

Now, I believe it is the State's duty to take care of the incipient cases, and that the counties and the cities should care for the advanced and hopeless cases. The State should do the general educational work, the research work, and everything of a general nature, which it is impossible for the county or the city to do.

Charles M. DeForest, New York: I am very glad that I am a reviewer principally. I used to be on the staff of Mr. Nelbach and I want to say, in justice, to my former chief, that he did not change his paper very much, for I had a copy of it and have been going over it, trying to find some loophole where I could get in. It was pretty well closed; if I had to produce anything original, I should be just about as much up the stump as a certain young man who came to Scranton, Pennsylvania. He was up against it and had just three dollars and a half. With this he bought a meal-ticket and starting out dropped it on the sidewalk before he had had his first meal. A miner came along with his hobnailed shoes, stepped on it, and when the young man picked it up all twenty-one meals were punched.

I am very glad Miss Beals laid emphasis on the visiting nurse problem. I think that should get as much emphasis as the county sanatorium. I was particularly glad that Mr. Newton brought out this point about the immensity of certain counties. When I first started out after an apprenticeship in New York State, I felt like putting New York State first, but though I am still a

neophyte, I realize that conditions vary. Mr. Nelbach brought out the point that in New England the center is in the towns. I think a little too much stress has been laid on the county as a unit. I see possibilities in the grouping of counties. I understand that in some States, as in Minnesota, they seem to be grouping counties successfully, and when you have States with individual counties which are larger than little Rhody or Delaware and with such a population as has just been pointed out, a county sanatorium for that county alone is an absurdity. In some sparsely settled sections, it would not be amiss to talk a general hospital, a general hospital with a tuberculosis division for a group of counties. Of course, that should be only where the population is very sparse.

Now, how to group the counties together is a practical problem politically, but I think the State may well take a hand in that, and I think that the best way for the State to avoid putting the screw too roughly is to give State aid.

I am inclined to agree with Mr. Nelbach that mandatory establishment of hospitals should not be recommended. But there is a way to encourage their establishment. In Minnesota there is a law which requires that the county, or the town and the county, shall make provision for the advanced or the moderately advanced case, not necessarily in a sanatorium, but see to it that the patient has care and is not allowed to pass on the contagion. It is enforced in this practical way: The State Department of Health steps in and sees that that patient is cared for and has the right in law to charge the expense to the county and to the town. The Minnesota law also works, though not by mandatory provision, for the establishment of county sanatoria, in this way: It provides, under the statute which I have just referred to, that the care of the tuberculous must be a charge, nolens volens, on the county or the town; but if the county will build a county sanatorium, then half the expense of construction and half the expense of maintenance, within certain limits, shall be borne by the State. In that way, the county has an inducement to go ahead and put up a sanatorium. That act is comparatively new, but it seems to be working out well so far as it has been tried.

There is one little point that I want to raise, at the risk of being considered a heretic. The speakers have been emphasizing the fact that the county sanatorium for the tuberculous should be separate from the almshouse administration. I quite agree with that, but in one of the northwestern States I found this advantage in caring for the tuberculous in the almshouse. Let me give a theoretical case. Suppose the counties do have a county sanatorium entirely divorced from the administration of the poor laws. Suppose that it has enough population so that it has a large almshouse, in which provision is made for the tuberculous paupers. It seems good to me to have that provision at the almshouse sufficiently large so that the county may run into it the floaters and the rounders and the itinerant lungers who, particularly in the West, are just bumming around for their sustenance, in order to segregate them from the tuberculous patients who are strictly residents of the city or county. If there is a requirement for getting into the county or State sanatorium of at least a year's residence, then if you have this division in the almshouse there is certainly an advantage in being able to put into it the tuber-

culous floaters and tramps. Of course, if there can be just one place for the tuberculous, I would advocate most heartily the sanatorium which is entirely separate.

Another point: I have noticed in the Western States how necessary the county sanatoria are to let the State sanatorium fulfill its functions. I think we would all agree that its function is mainly to care for the incipient cases. Unless there are county sanatoria which care for the advanced cases it is under pressure of popular opinion to keep the advanced cases also. I can think of a State sanatorium not very far from here that is crowded with advanced cases. Mercy cries that they should be given care, but in the meanwhile the incipient cases are waiting.

Mr. Nelbach brought out the point of centering the movement against tuberculosis in the county sanatorium. If centering means position, I would not take exception, but if it means concentrating there all the anti-tuberculosis activities of the county, it would seem to me that while that is ideal it is a rather difficult ideal. I would suggest that the county sanatorium in branching out into activities beyond its own confines first take up the after-care of its cases and, possibly, next the control and supervision of dispensaries as well as visiting nurses. On the question of education, it does not seem to me, unless the case is very exceptional that the time is ripe for the county sanatorium to take up the question of education, at least in a way, to duplicate what the schools should naturally do. I am firmly convinced that in the question of education against tuberculosis, a very important channel is the whole State structure of the public schools. In some States, the superintendent of education is so interested that he takes the lead and the whole system through the superintendents and the principals fall into line, and you have that great, potent force reaching the children, the fence at the top of the precipice instead of the ambulance at the bottom. Of course, the county sanatorium can carry on some educational work, but for the present, it seems to me, if it confines itself to the more immediate functions of a sanatorium and hammers away at them; and let the school system and some voluntary organization (which is at the present time a need, it seems to me, in every State as a check on activity under political control), look after the educational work, more would be accomplished.

DISCUSSION ON PAPERS BY DR. WHITE, DR. SACHS, AND MR. NELBACH

Miss Maude Van Syckle, Detroit: There is one point in Mr. Nelbach's paper which has not recieved sufficient consideration from other speakers. That is, education by the State. Not more than three or four weeks ago, the Legislature of Michigan appropriated one hundred thousand dollars for an educational campaign. This amount is to cover a period of work for two years. The funds will be turned over to the President of the State Board of Health and a committee appointed by the Governor of Michigan. This committee plans to conduct an office in Lansing, employing an experienced man who will be thoroughly capable of taking full charge of the work. They will also em-

ploy from twelve to fifteen visiting nurses to go out into the counties. Over 6000 cases of tuberculosis were reported at the State Board of Health during the past year. These nurses will make an investigation of every reported case and in that way they will be able to ascertain how many more unreported cases are in each home, what the housing conditions are and will make a general survey of the situation. They will also give instruction and lectures and the educational campaign will probably be confined almost entirely to the rural districts and the small towns.

Dr. B. Franklin Royer, Harrisburg, Pa.: I did not intend saying anything in this discussion and yet Pennsylvania has been referred to so often by the speakers who preceded me that I cannot decline this request to say a word or two. You each have advocated your particular system. It is very clear to the minds of those who have followed the discussions in this section and in this Association for a period of five years, as I have, that most of us are very narrow—just as broad in our view of the problem as the particular municipality, the particular county, or the particular State which we happen to represent. The first broad-gauged view that has been expressed in my presence before the Association has been that by my friend—Dr. White, and yet probably most of you feel and some of you say that it is Utopian. The first real practical, broad-gauged municipal view that I have seen expressed anywhere I found in the *Journal of Outdoor Life* several years ago—an article by Wing and Sachs. The other day in Chicago we saw that municipal dream almost fulfilled, that is getting all the various tuberculosis organizations in Chicago to pool their interests and make a great central tuberculosis organization for the municipality—dispensaries and sanatoria all under one centralized management. New York is trying to do the same thing. Certainly every large municipality, every city of the first class, a principality in itself, should control all of its tuberculosis work and it should undoubtedly be performed under the supervision and control of the Health Department. We are working toward that end in Pennsylvania. Unfortunately, in Philadelphia and in Pittsburgh, now almost a first-class city, they have not yet been able to finance such an undertaking and the State is helping both in dispensary and sanatoria care. Local home rule prevents the adoption of broad State plans in many States. In Pennsylvania it does not. I believe that Pennsylvania under the able supervision of Dr. Dixon has worked out for the State an organization quite as practical and as idealistic as that worked out by Dr. Sachs in Chicago, the whole organization being planned with population centers as the basis, ignoring county lines and organizations. That organization will be further elaborated year by year as more funds are available.

We have under the one organization—the State Department of Health—dispensaries, three large sanatoria with about 2000 beds, a large corps of visiting nurses with follow-up work in all lines, a housing bureau, and are gathering together statistics of discharged dispensary and sanatoria cases with fairly complete sociological data that will some day be of immense value in determining organization methods and study of the entire tuberculosis problem. We have accepted from the first the view that the tuberculosis program should be a public health program and we mean to work it out along these lines.

Probably we shall have a chance some day to utilize some of the Utopian views of my friend—Dr. White.

Dr. Isaac W. Brewer, Geneva, N. Y.: We have spoken here today a good deal about what we are going to accomplish and the various means by which we are going to accomplish it, but I think one of our chief means is the visiting nurse. I have been interested in that subject and I have taught men and women a great deal about that work for many years. I want to say that we are asking these women to do a whole lot of work and are giving them very few facilities for doing it. There are very few women who can do it. I am reminded of the remark made by one of my friends who has to do with a large training school, He said, "A training school is an institution for working a woman beyond her possible endurance and for saving money for the hospital." I have been for three years endeavoring to get Cornell University to undertake the training of nurses and we are going to have it. The Cornell University Faculty do not know it, but the trend of things is toward that. Mr. Nelbach is going to help me, although he does not know it. We are going to give these women a place where they can learn to do this work.

Mrs. R. C. McCredie, Sunnyside, Wash.: I want to speak of the co-operation of the club women in the public health movement. It has been of very great advantage to us here. I am especially interested in the rural districts of the State, because I am a rural woman myself. Ignorance and indifference are the two great lions in the way. In going through the rural parts of the State one is continually shocked at the lack of precautions to maintain healthy sanitary conditions. Screens on doors and windows of homes are often lacking on many of the ranches. The toilets are too near the dwelling house and are often in a disgusting condition. Manure heaps are not scattered or hauled away to the fields. It is the educational feature which is the most important and the most necessary part of the movement for better sanitary conditions in the rural districts.

Michael M. Davis, Jr., Boston: I want to add just a word in relation to health education and the visiting nurse. It is very interesting to come into touch with a variety of public health movements and to see the parallel lines in which different movements are trending. There is, for instance, the National Association for the Study and Prevention of Infant Mortality with its annual conference and its publications similar to, though younger than, the anti-tuberculosis movement. Both movements must follow similar lines because both are fundamentally educational in relation to the medical and to the lay public. A number of other specialized health movements have similarly developed with national and local organizations—social hygiene, mental hygiene, prenatal care, school hygiene, and general public health nursing.

In developing these many different specialties we are laying an increasing burden upon the community. The public must put up more money and also more effort in understanding what these different things are about and why they need to exist separately. It seems to me that co-ordination of these different public health organizations or movements is one of the big things for which we must work. The anti-tuberculosis campaign, the oldest and at present the greatest of these volunteer health movements should not be behind-

hand, in thinking out its relationships to the other associations and in taking practical steps towards simplifying the situation for the public.

The visiting nurse is the field agent upon which all these movements largely depend for getting down into first-hand touch with the people who need help. The employment of an increasing number of nurses, each following out a different specialty, is a serious problem, both financial and social. In the future some way must be found by which the technical efficiency of the specially trained worker may be preserved and yet the disadvantage and the expense of a variety of different workers in the same family may be avoided.

The national organizations of nurses are meeting next week in San Francisco and they, like us at this Tuberculosis Convention, must and doubtless will seriously consider this question of co-ordination.

B. F. Shields, Seattle, Wash.: I am simply a man interested in dairy cattle and dairy cattle products. I am also vitally interested in the health and welfare of our citizens. It seems to me that this organization is a splendid proposition, but it does not dwell enough on the prevention instead of the cure. I believe that a great deal of tuberculosis comes from the cow, and that has been very little touched upon in the discussion at this convention with the exceptions of last night in reference to the tuberculosis test.

The tuberculin test is very good as far as it goes. When people think they are getting milk from cows free from tuberculosis because they have been tuberculin tested they are deceiving themselves, in fact committing fraud on the babies that drink the milk.

My experience is that there are about as many cows that have tuberculosis that do not show an affirmative reaction as those that do. Government statistics will bear me out in this statement. We should do more towards preventing tuberculosis than attempting to cure it after people have got it.

My firm conviction is that we should pay more attention to the cow. We shall not be able to do very much until cities take up the handling and distributing of milk from a central plant where it can be clarified and pasteurized.

Not until we give as much time to milk as we do to our water will we get very far with the eradication of tuberculosis of the bovine type.

Dr. William Charles White, Pittsburgh: I have but one thing to add. Dr. Royer has pointed out our proneness to be dominated by our local viewpoint. I am quite satisfied that in the sight of God there is no discrimination of State line, nor city line, nor county line, and quite sure that there is no special people living in any special county or city or State that is especially in the mind of God. It is perfectly clear then, that beyond our local desire there is our duty to the whole country and tuberculosis will never be overcome in the world if we stop at just what we are doing for one specific municipality. From the State side remember that no city and no county institution exists without the State's permission the State is the source of law, and privilege. In our federation of States no State can do anything that interferes with the welfare of other States without the permission of the Federal Government. Also it will eventually be, probably, that no country can do a thing that is of danger to the other countries of the world without some central permission. We may as well prepare our minds for this evolution. At some time probably we shall

have a uniform government for the whole world, when you and I can travel with the same privilege and with the same freedom in any country that we choose to go to, as in this, and be perfectly safe. Utopian or not, it is bound to come, and as a great part of this uniform safety is protection from disease, and tuberculosis is a big part of disease.

THE DUTIES AND OPPORTUNITIES OF THE STATE TUBERCULOSIS ASSOCIATION

By Miss E. L. M. Tate

Los Angeles, Cal.

If "by their fruits ye shall know them," then a private organization such as The National Association for the Study and Prevention of Tuberculosis has justified its existence by results. If in 10 years an investment of $5,000,000 is quadrupled, and the bed capacity in hospitals, sanatoria, and camps has increased from 9000 beds to 35,000 beds, and the death-rate in the registration area has fallen from 166.7 per hundred thousand to 127.7 per hundred thousand, then every State association has the unique experience of seeing dreams come true. For the impetus given to public health in general throughout the United States is undoubtedly due to the general awakening to the seriousness of the tuberculosis problem.

All private associations with a serious purpose and a definite goal to be reached undoubtedly look forward to the day when certain results are recognized, and the work of the State association supported by private individuals has become a part of the general plan of administration in State, city, or county. But the most important part that the private association has to play at that time is to see that the work is not taken over by the State, city, or county unless the association can still guide the way, because a blazer of trails knows the dangers to avoid. Otherwise years of striving to reach an ideal are apt to be brought too much into politics and the work of years be lost. So it is evident that the time is not ripe for dropping the reins and allowing the work to be taken over entirely without some supervision by the State association.

In view of the fact that the State associations have accomplished so much in dealing directly with the tuberculosis problem, I wish to call attention to the fact that we ought to begin a campaign against the contributary causes of tuberculosis; not that I suggest the State association leave for one moment the vital points in our own work, but in three sessions in the legislature I have seen countless opportunities where the State associations should have been in evidence. Much legislation that is enacted has a direct bearing on our own problem.

The mothers' pension law is a good example. In Wisconsin 2 years ago there was a fight against the enactment of a mothers' pension law. The State association managed in one of the bills to insert a clause that where the father was in an institution being treated for tuberculosis, the mother should be given State aid. There is no reason why, if the mother can obtain a pension if the father is in prison, or is insane, a commitment to a sanatorium

ought not also to make her eligible. Often it would make it possible to influence the breadwinner of a family to take the cure if he knew his family would be cared for in his absence. This has been done in Massachusetts.

This is particularly necessary in California, because 75 per cent. of the deaths from tuberculosis occur where the income is less than a thousand dollars per year; 47 per cent. of those dying are married, and 27 per cent. of the children cared for in orphanages are there because of the death of the father and mother from tuberculosis.

In many of the States the child labor laws need amending; particularly should medical inspection be made of all children asking for work permits. There should be a revision of tenement and lodging house laws; and, where it is necessary, an agitation for the reorganization of the State board of health, with the creation of a tuberculosis bureau, so that certain matters dealing directly with the State, and the State institutions, can be supervised by the bureau. Until an adequate appropriation can be obtained for such a bureau, none should be attempted; otherwise it defeats its own purpose.

The State association must be the advisor, particularly in matters relating to legislation. To show how much thought had been spent by the State in caring for its tuberculous poor, a questionnaire was sent to 20 States regarding their opinion as to whether State institutions for the tuberculous poor were not too expensive for the small number cared for. Eighteen out of the 20 were unanimous in their opinion that the function of the State association should be to make the county the unit for the work.

The State association should be the laboratory for the local associations, because the State association is in a position to go into the smaller towns, find out their needs and help them with a program that the local associations, without the State's support, would not be able to carry out.

I know of a number of instances where the State association has worked out a complete program for a local association. Four years ago in Wisconsin they had a record-breaking seal sale in a town where the State association was active. The local association wished to put their percentage into something that would show immediate results. The problem of a school nurse was a pressing one at that time, so the school board's permission was obtained and the local association's nurse began work in the schools. This soon proved to the satisfaction of the school board, and everyone concerned, that the superficial medical inspection she was making was not enough; a conference was held with the State association and the school board was persuaded to employ a physician to give full time to making a proper medical inspection with the nurse to do the follow-up work.

This continued throughout the year with satisfactory results, and at the end of the school year the State association went in again and helped the local association convince the school board that the school nurse should be put on the pay roll of the school board.

The following winter the same town won as their prize in the Christmas seal sale an equipment for an open-air school. The school board was extremely dubious because the winters were extremely long and cold, their schools were overcrowded and there was no room that could be turned over for an open-

air school until an interested and enterprising teacher discovered an old house owned by the school board. Permission was obtained to use it from January until the end of the school year to make a demonstration.

I suppose every tuberculosis worker has a number of instances "in the petty round of irritating duties" that they like to recall, and my connection with this particular local association is the one I like best to remember; and out of hundreds of meetings connected with the problem I like to remember the meeting that was held in the drawing-room of the chairman of the health committee of the women's club, on account of their interest and co-operation.

We had secured the school board's tumble-down house for the school, and they had the outfit and we had a teacher with the courage of a Spartan, but we needed a guarantee of money for the matron for 6 months and a guarantee for the diet of two meals a day for the school year.

I have never seen anything as interesting as the way the health committee came forward at that time to make the offer to be responsible for the matron and the food, and they did an extremely wise thing, they gave several groups in the town a chance to provide something for the school. One grocer furnished vegetables, one butcher the soup bone for the soup, a saloon keeper famous for his free lunches, asked that he be allowed to cook this vegetable soup every night, and promised to deliver it. Different lodges furnished the milk, and it was an unusual day that you did not look out and see at least two automobiles, and sometimes more, in front of that school. Somebody would make an extra rice pudding, or some one was bringing in a pot of beans for luncheon, and the result was that at the end of the school year at the last meeting of the school board when the budget was being made up a demand from the children in the school and the parents of those children, and other parents who had seen the splendid results, and who wanted their own children to profit by it, made such an impression on the finance committee of the board that they made an appropriation for another school, enlarged the capacity from 18 to 50, took over the salary of the matron, and the diet, and since then another open-air school has been established.

Meanwhile the State association has been carrying on in the county a very intensive agitation for a county sanatorium. The local association did not have the courage to attempt this. The political situation was acute in the county, owing to a factional fight, and only an outsider could attempt it. After a couple of years of hard campaigning the supervisors made an appropriation and built a beautiful sanatorium separate from the other institutions.

The local association is now carrying on the agitation for a rural nurse and when this appropriation is made, as it undoubtedly will be, their program, as far as machinery is concerned, is very nearly complete. The local association will continue to carry on its educational campaign, but the fact that at all times they are able to call on the State association to help them in any way, gave them confidence, which they would not have attempted without the strong backing of the State association.

And this seems to me to be the real function of the State association. The State association must have the opportunity and a definite program with which to help each locality. A State association that permits its local association

year after year to provide for a visiting nurse is not doing its best work. It should help the local association make the experiment, and if it is successful, it should help them with the work necessary to make the municipality and the school board, where they can, assume their responsibility.

In California the Alameda County Association has done an excellent piece of work. They have managed not only to have the association direct the tuberculosis work in the county, but the association is subsidized by both city and county. Six clinics a week are run by the association. The visiting nurse and secretary are paid from the city and county funds, a special fund for diet is supplied by the county, and the society supervises the entire work, using the funds from the seal sale for educational work, and tents which are loaned to patients, and for the equipment of the clinic.

In the western States where the counties—many of them as large as the entire New England States—the State association occupies a different position. It is necessary if the work is to be done properly to have the work in the counties organized much as the work in the cities is organized in the east.

The plan for county aid to the local associations with the State association doing what it can to create sentiment seems to be the better plan of organization in a State like California. From my own association in California I make an earnest plea to every State association to help us in an educational campaign, particularly through their publicity, to warn patients without friends to care for them, or sufficient funds at least for a year, to remain in their own States and take the cure.

Investigations made by the surgeons of the U. S. Public Health Service indicate that there is an annual migration of from 10,000 to 15,000 consumptives into the States of California, Arizona, New Mexico, Colorado, and Texas. From 30 to 50 per cent. of these are hopeless cases and die within 6 months after their arrival.

A large and unknown percentage die in the alms-houses, the tuberculosis wards of the county hospitals, or are the recipients of private charity. Forty to 90 per cent. of all deaths from tuberculosis in the west and southwest are natives of other States, nearly 50 per cent. coming from Illinois, Missouri, Ohio, Kentucky, Tennessee, and New York. The tuberculosis wards of every county hospital in California is filled with strangers.

The counties have been obliged to care for these strangers to the detriment and exclusion of their own patients. Many of the hospital superintendents, during some recent visits, when some complaints were made regarding the very bad condition in the wards, defended the institutions by saying that if they were better they would be so filled by people who had recently come that the county could not bear the burden.

In the San Francisco County Hospital the largest percentage of tuberculosis patients admitted they came from cheap lodging houses. In another county hospital 154 had been in the State but a short time.

I only mention this because this is the history month after month of the situation in our county hospitals.

A bill undoubtedly will be introduced during the coming session of Congress calling for federal aid for a subsidy for payment to States caring for the non-

resident indigents. All State associations have had the experience of desperately trying to find some institution in which to place the non-resident indigents, and this plan will not only help the States that have the problem but will be of great assistance to the other States of the Union; therefore, I ask at this time that each State association feel that it is its duty to co-operate with us in order that we may successfully carry out our plan.

The State tuberculosis associations seem to have had a rare privilege in the pioneering of work that had not been touched until they came into being. The western States, however, have a distinct advantage over the eastern State associations for we need but follow the splendid work done in the east. Our municipalities can look forward with the help of the State associations to the splendid work done in Chicago. Our counties can look forward to the ideal set by Wisconsin, New York, and Indiana. Our legislative program can be modeled by New York and Wisconsin. So because we are young our duties and possibilities are greater; and the future, since the older associations have shown us the way, seems indeed full of promise.

DISCUSSION ON PAPER BY MISS TATE

Arthur J. Strawson, Chicago. The charge against the societies farther east has rightly been made by Miss Tate. State and local associations should continue their attack upon the popular error, of sending advanced cases or indigent cases to the southwestern States. The Illinois State association dwells upon this by items to the English and foreign presses, securing and publishing letters from workers in the south and west and it believes that educational exhibits in schools and other public places, together with lectures, moving pictures and conferences are chief among the agencies to be continued in eradicating these errors; whether or not the campaign shall be successful with adults, it will certainly be so as waged with children and young people. Errors entrenched so deeply will not be eliminated in a year.

Perhaps the observations impressed upon one from the Mississippi Valley will not have much bearing upon the situation in either of the coast sections but from our own rather ineffectual State work we have derived some ideas thought to be of value for the present and future.

Into surrounding rural and semi-rural territory within the past few years many nurses of various training have been called from Chicago by State associations to do tuberculosis work—called to rural sections, Michigan, Kentucky, and other States as well as to several rural sections of the State of Illinois. From reports received of this work the following facts stand out clearly:

First, the attempt to do strictly tuberculosis nursing in a section not doing any general health work is nearly doomed to failure. The reason is that the State association has not arranged to do the foundation general health work necessary before the community will justify specialization in tuberculosis. In the concrete the neighbors pity John Jones suffering with pneumonia or typhoid fever much more than they pity John Brown leisurely weakening under the baneful action of *Lobacle bacillus*. This is well illustrated by the situation in an Illinois county where such a mistake was made and where

the tuberculosis society is now succeeded by a thriving public health association, with a community nurse. And as instanced by Mr. Newton of Texas, this morning, both urban and rural tuberculosis work were unsuccessful, evidently because the general health work had not preceded and as a consequence the trend of effort there is now toward general health work. The "answer" seems to be a broader organization of early tuberculosis work in rural sections. The tuberculosis nurse should have the attributes of a community nurse, if not the name. Most communities are not pre-occupied in this respect and when the work reaches the point of too much for one and a part time arrangement is not possible the way will have been paved for distinct tuberculosis work.

Secondly, it shows that the State association in local unworked sections should prepare to painstakingly train and develop the sympathies of local officials such as teachers, physicians, ministers, village and county representatives by the help of special literature, conversations, newspaper articles and other means. Success when such help is not cordially had may be achieved by splendid organizations or by individual devotion but certainly more easily and in greater measure if means are taken that will secure local co-operation in all the community health needs.

Lastly the decrease of tuberculosis is recorded to be slower in rural than in urban sections, therefore, now the rural work lagging behind calls for our most serious thoughts and concentration.

To do this and to discover to the communities themselves the importance of their own tuberculosis problem, is there not an opportunity by conducting a tuberculosis survey to do a valuable piece of work? Granges, medical societies, State boards of health or, as in Illinois, the State federation of woman's clubs may be interested to take the responsibility and do much of the work of such a survey.

To summarize: Let the State associations avoid specific anti-tuberculosis work in those rural sections where general health work has not yet been done.

Let local societies beginning their work secure fuller, local co-operation in general health matters.

Just now the need is evident for special emphasis in rural work to keep it abreast of the urban tuberculosis achievement.

Dr. LeRoy S. Peters, Albuquerque, N. M.: The indigent consumptive problem, of course, is a grave question and a question which I predict will not be easily solved. In the past, people have sought climate for the cure of tuberculosis and climate will always remain a factor in the ideas and the desires of an individual who is a consumptive. It makes no difference what you may tell a patient who is suffereing with tuberculosis of the foolishness or the foolhardiness of attempting climatic change to effect a cure; the patient who has that idea so thoroughly instilled into him from past generations will believe that if he can only reach that climate, regardless of how little money he has, the long-looked-for goal will have been attained. If we do anything at all with it, it will be in the way of education from the physician. The State organizations throughout the middle West and East can take up that problem and try to educate the public, but the public will not be educated

in that way. If a man has faith in his physician and the physician says to him, "Why, you are suffering from an incurable tuberculosis and unless you have the means you should not attempt a climatic change," that patient will probably believe his doctor, but will take very little stock in what comes from an organization purporting to home treatment.

The indigent consumptive problem, I believe, is worst in the thickly populated areas of the southwest. Colorado and California get more than their share. There are also very many in Arizona, but in New Mexico we have very few indigent consumptives. The resorts in that country are very little known, compared with the resorts in California and Colorado, and it is also a well-known fact that the majority of men with little means will seek the large centers of population rather than the small towns which we have in New Mexico, thinking that they will be able to obtain employment, or, if they are not able to do that, they will be cared for by the people of that section. When in New Mexico, you remember that you have no large city, you see that the question with us is not so much the establishment of State institutions or sanatoriums for the care of these people, because native tuberculosis is not known with us—not because the climate protects, but because we have no large centers of population and tuberculosis, of course, is a disease of these large centers —as it is an educational demand. We have attempted there more an educational campaign than a campaign for the establishment of institutions, for the care of these people. We are endeavoring to educate the children against tuberculosis, we are trying to show the people the mothers and fathers, the possibilities of infection in childhood. I agree with the Germans—I do not agree with the Kaiser in his military exploits—but I do agree with the Germans in their ideas of infection and immunity and I believe that to control tuberculosis in the future, the campaign of education must be directed against the infant in arms rather than against the adult, and I predict that when this is done tuberculosis, in the days to come, will be as rare as the smallpox has become since vaccination was introduced by Jenner.

Dr. Charles C. Browning, Los Angeles: Since I have received notice that I was expected to discuss this paper, I have had in mind considering just one phase of it. I am afraid that will disappoint the chairman. It is one which I have been thinking of for some time, the problem of the southwest with reference to some organization looking to government aid and which the writer referred to as a national bureau of tuberculosis. I believe that that must come and I believe it may be brought about without radical legislation. The people of the southwest, the county supervisors, the councils of the cities of California I know have objected to improving their hospitals because of the fear that tuberculous patients would come in greater numbers. That fear is disappearing and with the legislation that has just passed our legislature and has been signed by the governor we find that several counties are already preparing to improve the conditions in the county. Now, then, I believe, that through the United States Public Health Service this problem may be reached. They have done well with other diseases, and yet the disease which is carrying off the greatest number of the human family, tuberculosis, they have not touched except recently in a survey of certain sections of the United

States. I believe that certain hospitals, which may be brought up to a given standard, can be selected and inspected by the public health officials and the government provide care for the cases which do not belong to that institution. Now, as a practical suggestion to bring that about! We know and we respect, and I have a personal acquaintance with and a personal admiration for, our public health officials, many of them and especially our present surgeon-general. I appreciate the efforts he has made in having the survey made and he should be encouraged in the work. I believe that when the time comes that the personnel of these officers is to be changed, that the members of this society should use their influence to secure the appointment of a man who is interested in tuberculosis.

Mrs. Christen Quevli, Tacoma, Wash.: Since the topic of our discussion is the duties and opportunities of State associations toward local leagues, I thought it might be of interest to get the view point of one whose connections and interests have been equally divided. It seems to me that the ideal relation between the State association and county leagues, should represent the relation between the highest type of mother and child. As a parent's prerogative, the State association must define a policy State wide in scope, and fundamental in principle. She must be impartial in her treatment if she would hold their confidence. She must be unselfish but firm when family interests are at stake. She must set the ideals of the local leagues, she must study the needs of each and to the best of her ability advise and guide that special child over critical periods. If she has a weakling, whatever may be its weakness, it is her duty and privilege to stand by, a tower of strength and advise and assist in overcoming their obstacles. How many of our great men attribute their greatness to the help and inspiration of their mother, so in the same way many of the most successful leagues attribute their progress to their mother association. A child can usually overlook and condone mistakes in a parent but partiality leaves a sting time cannot heal. Through legislation she must prepare for their future welfare, as this is, as it were, her only life insurance for them.

She must concentrate on the fundamentals and also assist, encourage and direct any special undertaking of any one of her leagues. Unfortunately it so often happens a county proud of her local achievements, and when she has mastered the first rudiments of being, as it were, she often feels that the mother association has outlived her period of usefulness, yet how much more does a child need its mother at the dangerous period of adolescence, when really their future usefulness is determined. Surely few of us feel we have ever outgrown our mother. Closely connected as I am with the State and county association and familiar with the inner workings of each, I know that the relationship is really ideal and to this almost perfect co-operation I attribute the progress and success of the tuberculosis work in Washington.

Miss Bethesda I. Beals, Seattle, Wash.: It seems to me no matter what the special problem of any State association is, all State associations to do good work must have as their chief purpose the standardization of tuberculosis work in their States. A State association is in close touch with the larger movement outside the State; with the national association, and with the

needs of the various localities in the State in a way that a local league cannot be. Given this perspective of the problem, the association is enabled to judge of the value and propriety of any proposed undertaking, and to mould the sentiment of the local organization and the general public for a high and uniform standard of work. For instance, in our State, a certain county was in great need of a tuberculosis hospital. The commissioners seemed loath to undertake the work at that time, so some of the more impulsive citizens and officials wished to put up temporary buildings, or even tents, on the poor farm to relieve the situation, and then to campaign for permanent and separate quarters. The State association was appealed to, and when it was pointed out that their example would set a low standard for the State, that other counties, and even States, would follow—especially as it would be an easy solution of the institutional problem—the plan was dropped and arrangements made for a splendid separate institution, which is now near completion. In this State all the institutional undertakings so far are such that we may be, and are, very proud of them.

In addition to laying out and instituting campaigns, an association representing the organized anti-tuberculosis effort in a State, and fighting for the highest ideals in the work, not only has to be but can hardly avoid becoming the clearing-house also to which is referred questions affecting every phase and angle of the work. Not that a satisfactory solution to the many knotty problems submitted can always be secured, but valuable information at least is gained by the discussion, and by the fact that a mutual understanding has been reached or a tentative policy agreed upon. Any association which is recognized throughout the State as rendering actual public service through expert advice and sympathetic support, is doing one of the things, it seems to me, for which a State organization exists.

Undoubtedly the chief opportunity for definite results by a State association is along educational and publicity lines. The State association, by a campaign of lectures, motion pictures, and exhibits, can arouse public sentiment through the authoritative information given, and gain intelligent sympathetic support for the building of institutions, the establishment of clinics and open-air schools, or the employment of visiting nurses. The temptation for the association to undertake to manage and finance these movements is sometimes strong, but I do not believe these lie properly within the province of State associations. It should imitate them and co-operate with the proper agency firmly to establish and maintain the work. I once read a definition of co-operation which we all might do well to remember. Here it is: "Do not ask the other fellow to do *your* work but to let you help *him* do his." So, while we ask the municipality or county to assume a responsibility, we stand ready to co-operate by furnishing publicity and information to their public as they cannot do themselves.

A State association should not fail to take advantage of the opportunities offered by the large educational undertakings, as the sale of Red Cross seals, the observance of Tuberculosis Day, and the other State-wide and nation-wide campaigns in the work. It seems to me that much strength is gained, and much good done by such participation. Every locality in the State should

know about these activities: and we should leave nothing undone, as far as possible, for their wide observance.

We in the West, have very different special problems in State association work than you in the east, but, nevertheless, I think that the things spoken of here—the standardization of the organized tuberculosis effort, its centralization in the State association, its unification, and the confining of the association work to educational questions—are really the true functions of State associations.

THE DUTIES AND OPPORTUNITIES OF THE LOCAL TUBERCULOSIS ASSOCIATIONS

By James Minnick

Chicago

It is not the purpose of the writer of this paper to attempt to discuss all the duties and opportunities of the local anti-tuberculosis associations.

Although we are all striving to attain the same end and we have for the most part the same general program of work, in different communities, because of financial, social, industrial, political, and other distinctive local conditions, the work of each organization will present certain distinctive features; these together with the experiences and point of view of the individual and the factor of time in the development of the work, make at a given period, certain things stand out prominently for consideration.

The time comes for the formulation of certain definite policies and decision must be made as to the inclusion of other new undertakings in the working program.

We no doubt all agree that the one final accomplishment of the anti-tuberculosis movement is the *eradication* of tuberculosis.

Many and various undertakings must make up the program of action to bring this about. Within the compass of these undertakings lie the duties and opportunities of the anti-tuberculosis movement.

Whatever courses of action, however, that seem necessary at any one time, there must be ever kept in mind the one ultimate object.

Eradication is a big undertaking and makes necessary a broad program of many activities.

Plans for the treatment and cure which have formed the chief activities of many organizations in their beginnings will gradually be augmented and come eventually to include many efforts for general social betterment.

In the beginning, of necessity the first activities of a local organization will be put forth in behalf of the tuberculous patient. Community sympathies which are the foundations on which the organization must invariably depend for its maintenance will demand this, and especially will this be true in the smaller communities. Very soon after an organization is formed, some one will come with a plea for financial assistance for some deserving family reduced to poverty by tuberculosis, and the organization is compelled to face a problem upon which there has not yet been worked out a satisfactory and definite working agreement of what to do or of co-operation between the charity organization societies or general relief organizations and the anti-tuberculosis societies.

With the present widespread and more or less heated discussion throughout the country on the question of administrative expense and relief funds of

philanthropic organizations, if relief is not gotten for the distressed family immediately, the question will be asked, "What is the good of the tuberculosis organization?"

The relief needs, however, in a small community will be many times larger than any funds that the local tuberculosis societies will ever be able to raise, and plans for eradication will be forgotten, if funds are dissipated in relief.

More definite instructions ought to be sent out from the national and State headquarters to the local organizations on this question. Relief must be obtained and in many cases without delay, and the tuberculosis society must set forces to work that will procure necessary relief from whatever available sources there are in their communities, but they should not draw upon their all too meagre treasury for relief.

In larger cities where there are adequate relief societies, the question has been constantly raised as to what the tuberculosis societies should do and what the relief societies should do.

Conferences must be held and a working agreement entered into. The excellent article by Mr. McDugal in the May *Bulletin of the National Association* is a valuable contribution to this subject. This subject was the chief topic of discussion at the first meeting of the Mississippi Valley Conference at Memphis, and it was generally agreed at this conference that the person or family in distress because of sickness presents no different problems of relief if the sickness be tuberculosis than if it be typhoid fever, diphtheria or any other illness, and the family should be treated accordingly, and the needs of the family should be cared for by the general relief society.

It is only when certain special needs arise which can be classed as part of the treatment for tuberculosis, such as the furnishing of special diet, or of special clothing, or building an out door porch or sleeping quarters, beds, bedding, such things in fact that can be classed as necessary to the treatment of the disease should the tuberculosis society be called upon to furnish them.

The second need the tuberculosis society will be called upon to supply will be the attention of the tuberculous sick.

What facilities are there for the diagnosis, care, treatment, instruction, nursing of the tuberculous patients? What institutions are there that can be called upon to assume any of this work? How can the necessary institutions be provided?

Those needs together with the relief problem are the first pressing demands.

Here are the tuberculous sick, what will the tuberculosis society do for them? Dispensaries must be established, nurses must be employed, sanatoria must be built. Most often the nurse will be employed first.

But whatever the society undertakes in this matter, it must be done more with the view of the education of the community as to how to meet the needs and of setting standards, with the purpose of ultimately turning over to the community the complete care and treatment of the tuberculous sick as a public duty.

The nursing problem presents some phases that need immediate consideration. Societies are calling for nurses and none are to be had. I have openings in my own State that I cannot fill and I am being asked by societies in adjoining

States to send nurses to them. With the number of training schools and the number of nurses in tuberculosis work in Chicago, it would seem easy to supply nurses.

Experience shows, however, that the nurse who has worked in Chicago is more often unfitted to do work in a small community. The nurse in a small community must be nurse, charity organization society, probation officer, truant officer, in fact, the general charitable and social agent. The nurse accustomed to work in the large city and who has been used to referring to specialized agencies, all the problems of her charges except that of nursing is bewildered by the many demands made upon her which she must work out unaided in a small place She does not know how to go to work; in addition to her nursing training she needs a complete course in a school of civics and philanthropy, plus a personality that will win co-operation. Few are capable of filling so complex a job.

It would seem that courses in civics and philanthropy with opportunities for field work should be provided by the training schools.

Even this is not enough.

I would urge that a committee be appointed by The National Association for the Study and Prevention of Tuberculosis to make a thorough study of the problem and to formulate plans.

This committee ought to work in co-operation with the committee on instruction of tuberculosis in the medical schools recently appointed by the National Association.

Ofttimes it happens that when a competent nurse is sent to country towns she finds many even advanced cases of tuberculosis yet she will fail to get the physicians to diagnose them as tuberculosis at all.

Recent experiences of the Illinois State Association in a remote county of the State, disclosed some startling conditions and necessitated a call upon the State Board of Health to bring certain physicians to account.

A sectional meeting on tuberculosis should be created at the meetings of the American Medical Association and at all the meetings of the state medical societies of the country where papers and discussions, such as are had in the clinical and pathological sections of this association, could be heard by physicians who never attend these meetings.

But why are not more physicians at the meetings of the National Association? Also why are there not more nurses here and why not more secretaries?

Is it not one of the duties of the local associations to send their secretaries and nurses to these meetings?

The National Association should impress this duty upon the local societies. I am sure the secretaries desire to come to these meetings but many of them are not in a position to urge upon their own societies the necessity of their coming. This should be done for them by the National Association.

I should like to see a systematic campaign conducted along this line for the next annual meeting. I call your attention to the example of the Chicago Tuberculosis Institute which sent to this meeting four paid delegates, the superintendent, assistant superintendent, and the superintendent and a nurse of Edward Sanatorium.

The chief function of the local anti-tuberculosis society is *education*.

Yet what about our literature on tuberculosis. We have been talking about it at these annual meetings, at the meetings of the secretaries, whenever and wherever groups of workers get together; of the need of small, instructive, interesting pamphlets for general distribution and yet here at the Eleventh Annual Meeting we are apparently no nearer a realization than at the Eighth or Fifth or any other.

Also what about authoritative pamphlets for distribution to the medical profession, text books on tuberculosis?

Over a year ago the National Association appointed a committee to prepare pamphlets. The American Medical Association has been at work upon the same problem and there is an opportunity through co-operation for the production of a valuable work. Yet comparatively little is being done. The local organizations unaided cannot perform this task.

We have learned in Chicago that the best means of instruction of the general public on tuberculosis is through an exhibit, yet notwithstanding our experience and that of New York City and after the valuable paper contributed at the last annual meeting by Mr. Stone, New York City and Chicago are the only cities, so far as I know that have permanent traveling exhibits.

I cannot in this paper discuss the duties and opportunities of the anti-tuberculosis societies in regard to the open-air schools, and medical supervision of school children, *nor* of the relation of the anti-tuberculosis movement to the general health movement, *nor* of the anti-tuberculosis movement to public boards of health. These are subjects for conferences rather than for a paper.

So also is the subject of the relation of the anti-tuberculosis movement to the movement for general social betterment. Nevertheless I wish to present a few thoughts on this subject.

There is need of defining a more comprehensive sociological program by the tuberculosis societies in the prosecution of a more vigorous campaign to help in the enactment of child-labor legislation, shorter hours of work for women, minimum wage laws, the reorganization of most of the public health departments of the country, proper tenement laws, more efficient sanitary regulations, etc.; thus striking at some fundamental social wrongs which are the causes of much of the tuberculosis we are trying to eradicate. This campaign should be undertaken not to the neglect nor in the least abating our primary activities, but we must ever be ready to throw our influence, and help to every effort striving for the improvement of any conditions making for better health and life of the people.

There has been some just criticism of the anti-tuberculosis movement by social agencies that we have not been as active nor have we exerted our influence sufficiently in programs of social reform.

The anti-tuberculosis movement must concern itself more in infant welfare work. In those communities where no infant welfare society is formed, this work should be undertaken by the tuberculosis society or organized by the tuberculosis society.

We should also strive for the enactment of industrial insurance, health insurance, non-employment insurance and other measures of such kind that have been developed so well in Germany.

At the time of writing this paper there was impressed upon me one very important matter. Through the efforts of the anti-tuberculosis movement millions of dollars have been expended from public taxes in the building of sanatoria, for the care of patients for the employment of nurses, for the maintenance of dispensaries, etc., in all parts of the country.

What assurance can we tuberculosis workers give to the tax payer that this money has been expended and is being expended in the best possible manner, or that the institutions that have been created are conducted properly and efficiently? Of course, it is the business of the tax payer to see that public funds are properly expended. But he has allowed himself to be guided by us and it is our responsibility to see that he is kept properly informed. Herein lies a very large duty to which we must give our careful and immediate consideration. The public has bent its sympathetic ear to our appeals and has responded in many instances most liberally.

What of our responsibility? How far have we succeeded in dominating the planning of the buildings and in the control of the institutions after they have been established.

The tuberculosis sanatorium both in its planning and in its management, presents a highly technical problem. In the planning of the buildings peculiar needs are apparent that do not arise in the building and equipment of general hospitals and all the special needs of the tuberculosis institutions must be carefully thought out and provided for in the planning of the institution. Experience has fairly well worked out these fundamental needs. Does the public architect, not always a man of marked ability or of wide experience, consult the tuberculosis expert when he draws his plans?

In the actual construction, how often is the sanatorium built economically or strictly according to specification, or how often is it built as most public buildings are built, many times quite perceptibly *not* according to specification and with evident poor workmanship and with the substitution of much inferior material.

When it comes to the more vital question of the administration of the institution after it is in operation, then what? Is the régime put in force founded on strictly scientific and thoroughly efficient methods, are the employes chosen absolutely on the basis of fitness and ability, or are they put into positions to pay political debts? How many of the public hospitals, asylums, philanthropic institutions are run absolutely on the basis of ability and fitness, and how many by incompetent political appointees who must be provided with jobs.

It is time to call a halt. Indications are on every hand that the politician is ever ready to listen to the appeals for creating public institutions in so far as he thinks he can safely go in the expenditure of public funds, but when it comes to the conduct of the institution it is most often the case that the politician makes it very clear that he wants no assistance from the expert. He is then in his own opinion, the all-wise chosen by the people to conduct the institutions as he sees fit, and of course only by the appointment of his own political henchmen.

We have got squarely to face this fact if we are going to urge further the establishment of public sanatoria. We must hold ourselves responsible for the creation of proper public opinion for the management of these institutions.

One of the most important duties facing the anti-tuberculosis movement at the present time is to fight against the political control of our public philanthropic institutions, especially where the tuberculosis sanatoria are concerned.

Just now in Chicago we are concerned to know whether our great Municipal Tuberculosis Sanitarium is to be allowed to develop along the efficient and comprehensive lines laid down in its conception or whether it is to become a politician's asset.

The whole country is going through a critical period. The forces of reaction are compactly organizing and the result of elections in different parts of the country show that they will spend unlimited sums of money to gain their ends.

The labors of some recently appointed legislative investigating committees for the ostensible purpose of inquiring into the conduct of philanthropic institutions will no doubt do some good, but from the methods of their work it appears that they were planned primarily to discredit, if possible, the activities of social agencies, settlements and social workers in general who are responsible for the growing demand for improving social and industrial conditions, such as, abolition of child labor, shorter hours of work for women, minimum wage, improved living conditions, sanitary dwellings and work shops, better health laws, etc.

The interests of the anti-tuberculosis movement lie with those of the general philanthropic and social betterment organizations and our cause prevails or falls as they succeed or fail.

The recent attacks in the New York legislature to impair the work of the New York Health Department, the efforts to destroy the Tenement House Commission, the attempt to sell inro slavery the women and child workers in the canning industry—the sight in Illinois of big business depending en masse on the legislature and demanding the pigeonholeing of social betterment legislation, 'just let business alone," never mind the woman worker, the child worker, the pestilent tenement, do not disturb investments, they are sacred.

We of course recognize that business has had a hard time of it the past year and that some unwise legislation has been urged, but we also recognize that the reactionary forces are taking undue advantage of present conditions to try to set back the tide of social and industrial advance all along the line.

We must fight this move with all our strength.

The eradication of tuberculosis depends largely upon improved social and industrial conditions.

These two things demand our immediate and persistent effort—efficient management of public institutions free from political influence and to throw our influence and organized effort to the cause of human betterment.

DISCUSSION ON PAPER BY MR. MINNICK

Dr. Robert M. Stith, Seattle, Wash.: Mr. Minnick has so ably discussed the functions of the local association that there is very little left to say except as it concerns our own local association. Functions will necessarily vary with the locality. Problems are different in each community. The work of our local association was instrumental in creating a public sentiment for visiting nurses, dispensaries, and sanatoria. Later, as the problem became developed, showing that it was too big for private philanthropy, it developed a sentiment for turning the work over to the municipal Health Department, where we feel that the work properly belongs. Since the work has been taken by the Health Department, the local health association, apparently, to some extent has neglected the work, only slightly perhaps. We feel that a more intense interest on the part of the local association would be a great help to the Health Department. Recently, the local association has exhibited a renewed interest and they have appointed a committee of twenty members to act as an advisory committee to the sanatorium and to the tuberculosis work in general, to act in co-operation with the Health Department. The committee will be subdivided into smaller committees, dealing each with separate division of the work. We believe that this will be a great aid. There is always a danger that a public institution will be dominated through politics. I believe that with this large committee of prominent laymen, business men, philanthropic with this large committee of prominent laymen, business men, philanthropists, we shall in a measure be able to forestall political domination.

The function of the local committee is not alone one of supervision in health department work. We necessarily have to deal with the individual with tuberculosis; but should always consider the family as the unit, not the individual. I believe it is the function of the local organization to consider that family unit even more than the Health Department is able to do. The object of the Health Department is particularly one of protection, i.e., prevention but it may be that the problems exhibited in that family call for the relief of that family, of its children, from other troubles; which is more properly the work of the local organization than it is of the Health Department.

Mrs. Charlotte Underhill Brewer, Geneva, N. Y.: This subject of the local association has been so ably presented that I think there is no doubt in the minds of any of you what the duties and the opportunities of the local association may be, but the difficulty is, how are you going to accomplish it? The local association differs in the little town where there are, perhaps, a half dozen people who may know something of the situation and may not, and in the larger town where you find perhaps a few physicians who are interested in the work, and again in the large cities where the work is ably organized and the duties are well laid out so that the work of the local association is thoroughly understood from the start. Now, the problem really is—of course, the large cities have their work organized—the problem is with the smaller cities and with the rural districts. The interest of the local association means everything to the movement. The people who compose this association may know

something of the work and they may not. There has been some one come with an exhibit and a certain amount of interest has been aroused in the work, the people have sold Red Cross seals, they have some money on hand, they want to spend it, they want to do something to advance the work of tuberculosis. Probably, the next step is the nurse. Then, when the nurse is brought into the community, she is introduced to the committee. The committee then expect her to organize the work and carry it through, and one who has been trained in a large city and who has worked where there are societies to which she may refer any unusual problem that comes up is especially handicapped in the small town or in the small city. There may be some method of relief work, but for the most part there is no charity organization, there is no board of men or women to whom she can refer. There are cases that really do not belong to the tuberculosis work at all, but must be taken care of in the general course of the public health work, and I think that is what a public health nurse means. Of course, it is too bad that the tuberculosis nurse has to do all these things, but it makes her more valuable in the community if she shows that she is able to handle all these problems, and if the interest of the community can be aroused there will be no difficulty at all in procuring the funds. It will not be necessary to draw on the funds of the organization for any relief work that is necessary; it appeals to every one; there is scarcely a family who has not some tie along that line and the people respond very, very promptly. Of course, upon the confidence of the public in these nurses depends the forthcoming of the funds to carry on the work and the nurse has a large problem ahead of her. She must interest the people who are providing the funds, she must interest the general community and, above all, she must obtain the confidence of the people in the homes where she visits. It means a general knowledge of human nature and, above all, the ability to make friends.

Sherman C. Kingsley, Chicago: I will be very brief, because I understand that you have a fine ride ahead of you and I have been told that the committee are anxious that this section should close promptly.

Mr. Minnick did even a more remarkable thing than your Chairman. He completely rewrote his paper after he had been strongly advised to do so by a number of people. As he originally had it, there was no "punch" in it at all. He is a very conservative kind of person and we wanted him to go after somebody and really say something with some "ginger" in it, and you see what a fine paper that brought out.

One could say a great deal on this subject. I am impressed with the multiplicity of things that devolve upon the local association. This always happens when any kind of work, and especially tuberculosis work, is started in a community. The demands are simply enormous. I am impressed with another thing on which Mr. Minnick touched in his paper and that is the desire for light, for information, that exists in all these communities.

What impresses me more than anything else is the amount and the kind of help that the National Association is called on to give and the State associations as well. They are fairly overwhelmed. There are in nearly every community those two or three people at least, fighting the fight of their lives, try-

ing to get larger groups to see the things as they see it, because they have been in the families and they know the needs existing. There are hundreds of communities scattered over the country that want the kind of influence that a meeting of this kind can bring. Think of the value it may be in such sections! The Bible says, "Blessed are they that hunger and thirst, for righteousness, for they shall be filled." Well, there are a lot of people that want guidance in this great work. Now, I believe it is the task of the National Association to increase its ability to give this guidance and to take its influence to a new community each year.

THE RELATION STATE AND LOCAL ANTI-TUBERCULOSIS ASSOCIATIONS SHOULD SUSTAIN TO EACH OTHER

By Charles J. Hatfield, M.D.
New York

To determine the relation between State and local anti-tuberculosis associations, it is necessary to form a clear conception of the functions and duties of each. The duty of the State Anti-Tuberculosis Association is, first, to coördinate the existing agencies with accurate distribution of territory; second, to coöperate with local associations by means of advice, assistance in special campaigns, arrangement of conferences, district and State; third, to work in unorganized territory by education leading to future local organization; fourth, to act as a connecting link between the local societies and the National Association.

The functions of the local Association are: First, to coördinate tuberculosis agencies in its own territory; second, to frame a program aiming to complete equipment for the care and prevention of tuberculosis in the locality, and to work intensively on this program; third, to coöperate with all local philanthropic agencies, especially those dealing with public health; fourth, to coöperate with the state society and other local associations in making effective the State program and policy.

A detailed consideration of these various functions will give a clearer conception of the inter-relations of State and local associations.

Taking up the first function of a State association, it should be obvious that one of its first tasks should be to see that every city, town, village and hamlet is organized or covered in some effective way. This implies more than mere paper organization. It is an easy matter to visit a community, hold a meeting, and rally a dozen or two people to a new anti-tuberculosis association. It is easy even to equip such a new association with a full set of officers, a board of directors, a constitution and similar paraphernalia. But that is not what is meant by coördinating every square mile of territory in the anti-tuberculosis campaign. The State association must do more for its local associations than simply to provide *forms* of organization. It must see to it that that organization is effective, with a program for a year, or maybe two or three years in advance. More than that, it must by constant appeal, advice, suggestion, either through personal visit or letter strive to bring the program to pass. It is all very well to form a local society in Blankville and to arouse enthusiasm to the point of securing a visiting nurse, a dispensary or even a local hospital. The State association's job is only just begun. It should constantly be on the alert to see that no political, personal, or financial clog obstructs the

wheels of progress in Blankville. If the nurse is inefficient, for example, the State association should point out this fact to the local group and should labor to educate the nurse or get a new one. If the propaganda for a new hospital halts, the State association should ever be ready to step in the breech and stir up more enthusiasm for the local program. I do not mean that the State association should do the local association's work, but it should see to it that the local work is done.

As a logical outgrowth of the duty of organizing local associations and assisting them to do their best, comes the function of bringing to each group the experience of all of the others. This may be done by bulletins, letters, personal visits and interviews, or by conferences. The State association should do its best to promote the interchange of ideas. Provincialism is evident in anti-tuberculosis work as it is in politics or religion. Every time a local group can be brought to adopt the suggestions or experience of some other group, the barriers of narrowness are pushed back, and the inter-relation of all of the groups is furthered.

When a State association has thus organized and cultivated in an effective manner all its territory, it may be said to have begun the fulfillment of its first great function. As to the times and seasons for organization, that is a different question. It is never well to form an organization until it has the means back of it, financial and otherwise, for carrying out a program. Fortunately the funds for beginning the work can be secured in most cases by an energetic Red Cross Seal campaign.

The effective organization of all of the territory of a State association may be difficult of attainment and it may be a long way off. What should be the attitude of the State association in the meantime to the unorganized districts? Should all of its energy be devoted to the busy cities and the well organized counties, with no thought of the rest of the State, except when there is a chance to draw some revenue from it through Red Cross Seals or otherwise? I believe that the State association must constantly strive to secure strong organization in territory that is not effectively covered, even if such new associations draw away revenue that has come to the parent body. Only as the communities are set to work at an intensive program, will real progress in the anti-tuberculosis campaign be made. Again may I caution, however, against paper organizations that can never be made real.

As to the type of local association, it is evident from the experience of States such as Kentucky, Texas, New York, or Massachusetts—to mention some widely differentiated groups—that the form of organization should be adapted to the peculiar needs of the community at hand. It may be desirable in one place to form a number of city or village associations, while in another a county or even a district association may be best. In one community, a distinct and separate anti-tuberculosis association should be formed; in another a committee of an associated charities, a woman's club, a church organization or a chamber of commerce may be most suitable. Here is a county that will support a number of distinct village and city committees on tuberculosis with a strong county association over and directing all of them. Here is another more sparsely settled, where

the local organization must be an anti-tuberculosis committee, an associated charities, or maybe even a self-constituted board of health.

These contrasts will give some indications of the variety of forms of organization and programs that will be necessary. One may ask in this connection,"Are there any criteria by which we may decide which is the best form of organization?" To this question I would reply that the type of association to be found will depend mainly on three factors; first, the present condition of the community with respect to social organizations, i.e., whether there are many or few and whether they are generally efficient or not; second, the program which the new organization should adopt; and third, the possibilities of financial support. Let me illustrate with two imaginary cases: Given a community where there is a highly organized and efficient Charity Organization Society, with a salaried executive secretary and the general support of the community; where it was desired to concentrate effort strictly on tuberculosis and the necessary agencies to control the disease; and where it would be easy with the support of the Charity Organization Society to secure funds, we should say that the wise course would be to form a separate working committee of the Charity Organization Society. The new committee might have a separate secretary as in New York, Brooklyn, or Minneapolis, but it would be an integral part of the general organization. Given, on the other hand, a district, largely rural, with practically no organized social work, the separate association, preferably on a county basis, would seem to be desirable. It would stand a much better chance of getting general community support. Possibly the program of such an association might be much broader than that of the city committee, but this again would insure success. In general it is never wise to multiply organizations where good ones already in the field will do the work.

The third function of the State association is to act as a connecting link between the local associations and the National Association, and in this way to bring to every one in the State the experience of the whole country. The National Association, for obvious reasons of expense, cannot come into as close relations with local associations as the State association, even if it were not contrary to our policy to do so. This being the case, the State association must act as the transmittor of the ideas which it receives from the national office. Not all of the ideas which the National Association passes along from its world-wide view of the problem of tuberculosis will fit equally well in every State. Nor in a given State will all of the suggestions apply to each community. The State association's functions here should be to select those ideas, which from the intensive knowledge of the field it knows will best fit, and pass them along to those for whom they are most valuable. The State association will, of course, get suggestions and ideas independently of the National Association. These as well as new plans worked out by its local associations and itself the State association should pass along to the National Association. Too often both State and local associations give the national office credit for omniscience which it does not claim to possess. The work of any State or local association, especially when it has new features, should be explained to the National

Association, so that whatever is good or new may be passed along for the benefit of others.

Coming now to the functions of the local association, the first one noted is similar to the first mentioned duty of the State association, namely, the coördination of existing agencies within its territory. The problems of organization of a local association are not so extensive in point of view of territory, but they are none the less real.

There is first of all the problem of coördinating the various curative agencies, the hospitals, sanatoria, day camps, open air schools, preventoria, etc. The mere aggregation of these agencies does not accomplish the best results, unless they are made to work in harmony. Unfortunately in the ordinary course of events, a definitely coördinated program is seldom laid down and followed in local work, with the result that we may have two or three city departments running institutions, to say nothing of a dozen or even more private agencies, at work. The first job of the local anti-tuberculosis association should be to secure harmony of operation, if not unity of control.

Then, too, the local association has a real problem of organization in its aim to secure a favorable community sentiment. Such sentiment can be aroused by publicity, advertising, lecture and exhibit campaigns, or by work in schools, clubs, lodges, and elsewhere. A lasting benefit, however, is gained by organizing community sentiment through groups who will give special attention to tuberculosis at certain times. I cannot go into the methods here; but in any local community, there are clubs, unions, lodges, church societies or other groups, who will take a more or less permanent interest in tuberculosis if they are rightly approached. The business of the local association should be to get everyone in the community to know about and to help in the control of tuberculosis.

The second function of a local association is to frame a program that shall aim at a complete equipment for the cure and control of tuberculosis, and to work intensively on this program. What the program should be need not be considered here. It should be complete to cover every phase of anti-tuberculosis work, educational as well as institutional. The program will naturally include both the activities of the public, such as those of the city, State or county, and also that carried on by private institutions. It will also comprehend the fact that the functions of the private anti-tuberculosis association is to experiment, demonstrate and stimulate, not to build and conduct permanent institutions or to do work which the taxpayers' representatives can better do.

The third function of the local society, that of coöperating with other philanthropic and social agencies, especially those dealing with public health, needs little elaboration. Tuberculosis is a public health problem. Its very nature and causes, make for a broad-guaged campaign, which shall not only aim at the tubercle bacillus and his works, but at the bad housing, bad living and bad community conditions in which the germ fattens and thrives. Any movement for social betterment that is honestly conceived and executed is in a real sense an ally of the anti-tuberculosis campaign.

The fourth and final function of the local anti-tuberculosis association is coöperation with the State association and other local associations in making the State campaign effective. Anything that a local anti-tuberculosis association does to help in statewide work will sooner or later react favorably upon itself. Too few local associations realize this. They become narrow and self-centered. A condition that frequently precedes decay. The very essence of the campaign for saving human lives is missionary, and the more a local association attempts to limit this spirit, the more will that association itself be the sufferer.

State associations cannot exist without the tolerance and support of the local associations. If the state association fulfills a legitimate mission, as it surely does, there is a definite obligation laid on every local association to support the broad state-wide organization. Such support should be not only financial, but it should be moral and political as well. The State association is, in the last analysis, the servant of the local associations. Its service can be effective or ineffective as the local associations may decide.

The questions upon which friction between State and local associations most frequently arise are those of finance and authority. The problem of financing the work of a State society is a serious one. The State association should not appeal to individuals in a territory assigned to a local society, without the permission of the local society. The finances of a local society are always strained to the utmost to do the work in its own district. Therefore, when a State association has proven itself effective in the highest degree, i.e., has organized its entire territory,—it has given in charge of the local associations practically its entire means of income. In some states this problem is met through an appropriation from the legislature for the State work. This method is uncertain and in my opinion prevents the best development. At present it seems that the one way in which the important work of a State society can be best financed is through the Red Cross Christmas Seal sale.

Bearing in mind both the functions of the State and the local associations, it is evident that the financing of the State organization is, in fact, the responsibility of the local associations. The Red Cross Seal sale makes it easy for the local associations to help the State work, and if the State association does its full duty by the local association it will see to it that the sale in the towns is stimulated and made more efficient through its efforts. What percentage a local association should pay to the State work from its seal sale will depend upon circumstances. It may be 5, 10, 25, or even 50 per cent; but whatever it is, it should be remembered that this is not a high handed method of taxation, but rather a system whereby the local organization can help the State association to develop phases of the campaign that the local association cannot touch. The problem of the prevention of tuberculosis overrides city, county, or State limits; it is universal. All friction can be avoided if we look beyond the petty and immediate details to the big ideals for which we are all working.

DISCUSSION ON PAPER BY DR. HATFIELD

Seymour H. Stone, Boston: Most of us, I think, will agree that the main work of local associations should be confined to their own communities where there is always plenty of necessary anti-tuberculosis work to be done. A State organization, on the other hand, should naturally address itself to the problems of wider and more general scope, which cannot be properly undertaken by a restricted local organization.

The function of the State organization divides itself naturally, in my opinion, into two phases: first, the giving of assistance in those parts of the State not covered by local associations; and second, the oversight and co-ordinating of all the anti-tuberculosis efforts throughout the State. The discussion of this first phase has already found a place on another part of the afternoon's programme, and I want to call your attention for a few moments to the second phase, and to its importance in our anti-tuberculosis campaign.

If the various societies of a State are pulling at cross purposes, we are, of course, simply frittering away our strength. As one looks about upon the work of the various local agencies, one is struck first of all with the difference in the kind of things that they are trying to do. One, perhaps, is devoting its energy to running a hospital, another is absorbed in a dispensary, a third in nursing, and a fourth in an educational campaign. Now while, of course, the needs of one community vary somewhat from those of another, it is clear, is it not, that there must be certain general lines along which any average community must work, if it is to achieve the best results—there must be certain functions natural and appropriate to the local organization. Now is it not the business of a State organization to standardize these functions, as it were, to co-ordinate the work of the various communities so that they will all be exerting their strength in the same direction and for certain definite ends. The local societies are of necessity somewhat isolated in their work, often unable to take advantage of one another's experiences or to see in which direction their efforts and the efforts of the others are tending. A good State organization should act as interpreter and counsellor, and as a clearing-house for the experiences and lessons of many communities.

In every State there are certain definite laws upon the statute books dealing with the tuberculosis problem and other health matters; but local workers are often uninformed about these laws or hazy as to their meaning. It should be the business of a State organization to see that the local associations understand these laws, and to urge them to carry out a programme based on their enforcement. In Massachusetts, for instance, the law requires the following conditions:

1. The registration of all cases of tuberculosis.
2. The establishment of local hospitals and dispensaries.
3. The medical inspection of school children.

An agency that will keep watch over the various communities and see that these regulations are being uniformly carried out is rendering an important service.

And not only should the local agencies be influenced to understand the law and see that it is enforced, but they should also interest themselves in whatever future legislation will help them in their work. We touch here upon another very important function of a State organization. It should make it its purpose to enlist the help of the local tuberculosis societies in putting through good legislative measures and opposing unwise ones. It is sometimes surprising to see what an influence for good these local associations can exert, when they once become aroused to the need of action. They are often in a position to present their side of the case strongly to their local representatives at the State House, and to give to the public through the newspapers significant facts in regard to the pending legislative measure. The State organization should keep them informed as to the issues and as to how they may pull together in the campaign. Work of this sort inevitably brings all the anti-tuberculosis forces into close and effective touch.

An additional way of cementing this relationship is to have the local associations represented on the board of directors of the State organization. Not only will this bring the large association into more direct touch with local campaigns, but it will also show those who are connected with the smaller agencies the importance of working out a State wide plan for fighting the disease.

Unanimity of purpose and team-work are what is necessary, if a wise State policy for the suppression of tuberculosis is to be established, kept in force, and defended against attack. These can best be attained where there is a State organization strong enough to serve as leader and adviser for the smaller agencies.

Philip P. Jacobs, New York: I wish to present in conclusion just two ideals that occur to me as summing up the relation between State and local organizations, and, in turn, between State organizations and the National Association, as well. The first of these two ideals is, service. Obviously, the ideal of service is perfectly plain to you. It is spelled frequently "co-operation." The thing that the State association is trying all the time to do for the local association is to be of service to it and if the local association is doing its job rightly it is trying to be of service to the State association. Unfortunately, many associations have too narrow a viewpoint and conceive their service only as pertaining to the limits of their town, county, or village, as the case may be.

That leads me to my second ideal, outlook. How many local associations have an outlook? The State association must have an outlook. Without vision, the State association perishes. Without vision, a State association is dead; the very essence of a State association's existence is outlook and vision. But how many associations have a vision, really, a vision which goes beyond the limits of the town or city? What we need is an ideal of outlook, of broad-minded outlook. If we have these two ideals, first of service, and secondly of outlook, the problems of finance, of interrelation, of co-operation, of paternalism will solve themselves.

HOUSE INFECTION: A POTENT SOURCE OF TUBERCULOSIS

By Isaac W. Brewer, M.D.
Geneva, N. Y.

For 11 years this association has been studying tuberculosis with a view of obtaining knowledge that may be applied to the prevention of the disease. Year by year our work has been enlarged until today when we are for the first time devoting especial attention to housing in relation to tuberculosis.

Tuberculosis is the most universal of all diseases and there are but few adults who have not at some time or other been infected. Whether the disease develops depends upon the virulence of the germs, the mass of the infection, the duration of exposure, and the resistance of the body. The resistance of the body depends upon the food it receives, the work it performs, and the environment in which it lives.

To be successful in a campaign against disease, we must first know its cause and then the conditions which make the cause operative. The direct or exciting cause of tuberculosis is a tubercle bacillus. The indirect or predisposing causes are lack of proper nourishment, over-work, excesses, and bad housing. It is my province today to bring to you some thoughts upon the relation of housing to tuberculosis. In doing so I would remind you that to resolve the problem of the prevention of tuberculosis into its component factors, and to assign to each its proper weight is at present impossible. The factors which cause tuberculosis to be a problem have gradually developed along with our civilization.

There is a growing opinion among those who are taking an active part in the campaign against tuberculosis, that housing is one of the most important factors in the cause of the disease. Dr. E. A. Sweet has recently made a study of tuberculosis amongst the Mexicans in El Paso, Texas. He found the death rate from that disease among those people, to be 554 per hundred thousand, while for the registration area of the United States it is but 149. After discussing various theories to account for this frightful rate, he concludes as follows:[1]

"In looking further into the etiology of tuberculosis in the peon class one is struck by the frightful housing conditions which prevail and these are sufficient in themselves fully to explain the high death rate recorded. When one witnesses the inadequacy of the quarters provided, and the over-crowding and the unhygienic lives these people are forced to lead, it is not necessary to look further for the cause of their trouble and the entire problem is an open book."

"Time after time it has been found that tuberculosis has appeared in different families occupying successively the same dwelling."

Housing enters into the tuberculosis problem in three ways:

1. The house itself may be infected, that is the germs of the disease may be in the walls, the floors or furnishings.

2. The house may contain a careless consumptive who may directly infect the other members of the household.

3. The general sanitary condition of the house may be such as to lower the resistance of those who reside therein.

The records of our dispensaries and sanatoria show many instances of what appear to be house infections.

In bulletin No. 27 of the Pennsylvania Department of Health, we are told of a house in Cumberland County which during the period from 1880 to 1905 was occupied by four families aggregating 32 persons. At the time the report was made 11 had developed tuberculosis and there were 3 suspects.

In England and Scotland much attention has been paid to housing, and at the 1914 meeting of the British National Association for the Prevention of Consumption a considerable part of the program was devoted to the consideration of tuberculosis and housing. At that meeting Sir Robert Philip of Edinburgh said:[2]

"I have before me notes of four such dwellings. In each of these, two or three families came into occupancy one after another, and each family in course sent tuberculous patients to the dispensary. In the majority of cases the patient fixed the beginning of his illness at a date corresponding more or less definitely to the date of entrance into the house. After ample allowance for various fallacies, the evidence seems irresistible that the house is frequently the source of infection."

He further cites a house from which no less than 18 cases of tuberculosis came.

The veterinary surgeons tell us the same story regarding stables which have housed tuberculous cattle.

The question naturally arises are these cases of house infection or are they simple incidences of the direct transferrence of the disease.

It is well known that tubercle bacilli if enveloped in mucous may remain virulent in the dust of a house for a long time, provided thay are not exposed to the direct rays of the sun. Bruckner[3] found tubercle bacilli in an active state in the dust of a room a year after the death of its occupant from the disease.

Hance[4] made some very extensive observations at the Adirondack Cottage Sanitarium and was able to infect guinea-pigs from the dust of a room where a careless patient had lived.

Winslow and Kliger[5] made a quantitative study of the bacteria in city dust and with special reference to intestinal and buccal forms and found tubercle bacilli in from 5 to 10 per cent. of the samples of dust taken.

Most tuberculous persons who are treated in their homes are far from careful, and spitting on the floor or into the stove is not uncommon.

In such homes the children spend most of their time on the floor and we should not wonder at their having tuberculosis.

Those of you who have done any visiting amongst the poor consumptives well know that, with but few exceptions, every consumptive who remains in the home is a danger to the other members of the household. We all know of exceptions to this statement but we know of more sad cases of unnecessary infections. My experience with patients in a sanatorium where they had the most careful supervision and where I took great pains to instruct them personally and collectively in personal hygiene, is that it is most difficult to teach them to observe the precautions necessary to prevent the spread of the disease. It is easy to overcome the spitting habit but to learn the use of the handkerchief is very difficult. I have noticed this in other sanatoria and once was associated with a nurse "an arrested case" from a well known sanatorium, who had to be reminded contantly about the use of her handkerchief.

In the home the instruction and oversight is very limited and it is doubtful if many of the persons treated under these conditions use the handkerchiefs at all.

I believe that the home hospital is a dangerous way to handle the consumptive.

Great as is the influence of the consumptive in the home and of the infected house, I believe that housing affects the incidence of tuberculosis mostly by lowering the resistance of those who reside in the slums. As a rule we associate the word slum with the large cities but if you will look closer you will find that they exist in the small towns and villages and not infrequently in the rural districts.

Dr. A. K. Chalmers[6] of Glasgow, gives the following table for that city.

Number of rooms	*From phthisis Death rate per 1000*
1	2.5
2	1.8
3	1.2
4	0.7

The rate for the entire city was 1.8.

It will be seen that the death rate falls as the size of the house increases.

Several years ago while stationed at one of the forts in Arizona I became interested in the incidence of tuberculosis amongst the Indians of that region. Naturally one would hardly expect to find the disease very prevalent amongst the natives of a climate that is lauded as a cure for the disease. I entered into the problem after reading the reports of army surgeons who had been stationed in the southwest during the early days of the American occupation. Most of them reported that the disease was practically unknown among the Indians. However, upon corresponding with the physicians on the several reservations I was much surprised to learn that the disease was very prevalent amongst them.

Dr. John R. Walker[7] long a resident amongst the Sioux Indians says that they suffered but little from tuberculosis as long as they lived in tepees, but that the disease began to increase as soon as they built permanent houses. The same has been observed amongst the Apache tribe. The difference being

that in the tepee there was an abundance of fresh air while in the average Indian home there is nothing but dirt and a polluted atmosphere.

Recently we have had some illuminating studies upon the effect of confined air upon the human body. As a result of this work we are told that it is cool air in motion that does the good in the open air treatment of tuberculosis. Without denying the reliability of the work done by the investigators in this country and Europe I want to say that it seems to me the question has not yet been studied satisfactorily. What we have in a slum is a prolonged exposure to a vitiated atmosphere and we want exact experiments to show the effect of such an exposure upon the cells of the body. The work of Dr. Crile and his associates has shown that the cells of the body are markedly affected by outside stimuli and that under certain conditions the cells are badly damaged by such stimuli. We want a study of the cells with relation to the condition of the air in the dwelling.

Those of you who are really interested in the campaign against tuberculosis will do well to investigate the housing conditions in the town of your residence. I think you will find that they are not satisfactory, and that there is no law by which you can prevent them from becoming worse.

1. Public Health Reports, April 23, 1915, p. 1240.
2. Transactions of the National (British) Association for the Prevention of Consumption, 1914, p. 31.
3. Harrington: Practical Hygiene, 5th ed., p. 311.
4. Medical Record, December 28, 1905.
5. American Journal of Public Health, September, 1912.
6. Lancet, July 16, 1910, p. 168.
7. American Journal of Medical Science, October, 1906.

DISCUSSION ON PAPER BY DR. BREWER

Dr. George M. Kober, Washington: I am very glad that Dr. Brewer has given a very comprehensive view of the importance of housing conditions in relation to tuberculosis. The fact that tuberculosis has been regarded for several decades as a typical house disease, by our European brethren, shows that there must be an intimate relation between bad housing conditions and the prevalence of tuberculosis. Dr. Brewer has presented examples which suggest very strongly the effects of bad housing conditions on primitive peoples. The very fact that tuberculosis is not especially prevalent, if at all, among the Indians in their primitive state, and is now their scourge, almost causing their extermination, can be quite positively traced, I believe, to the housing conditions. He has given us a description of some of their homes which, are infinitely worse than no house at all. Their primitive tepees, at least, offered opportunity for copious ventilation, and although there may have been eight or ten members of a family occupying that tepee, there was never lack of pure air. It is also true that the Indians in their primitive state changed their tepees at least two or three times a year and always upon the occurrence of sickness, and very frequently resorted to destruction of the tepee by fire after the death of one of their members of the family. But when we put them into houses, practically one-room tenements, probably twelve to fifteen feet, with

little or no light and certainly little air, we saw at once that they became peculiarly susceptible to the effects of tuberculous infection; and this condition will go on until the government insists upon better housing conditions. I do not mean to suggest that we should go back to the tepees, but I do mean that they must be placed in houses that are fit for human habitation as regards air space, light and ventilation.

Some three years ago, Dr. Gorgas became impressed with the bad effects of improper housing conditions upon diseases of the respiratory organs, because he found that the colored laborers on the Canal Zone perished from pneumonia at a frightful rate, nearly 30 per thousand. He at once recognized that insufficient air space was the predisposing cause and directed that they be taken from their dormitories and that every laborer be provided with, at least, 50 feet of floor space. After that change, the next year, there was a death rate of only about 2 per thousand from pneumonia. He was called, as you know, only a year ago last spring as a consultant sanitarian to study the undue prevalence of pulmonary diseases among the gold miners of the Transvaal, South Africa, where practically every precaution had been taken to safeguard the men from the injurious effects of dust inhalation and yet satisfactory results were not achieved in the diminution of pneumonia, fibroid phthisis and tuberculosis. He concluded that the best advice he could give was that their employes were properly housed. Of course, sufficient time has not elapsed to demonstrate the effects of his suggestion. I have no doubt, however, that as in the Canal Zone so in the Transvaal, improved housing conditions will bring improved health conditions, with special reference to respiratory diseases.

We know that in the British and in the American armies and navies, where men are, of course, admitted in good physical condition, the death rate from respiratory diseases, particularly pulmonary tuberculosis, has been decreased more than one-half in the last four decades, as a result of providing increased air space.

We also know that the colored race respond very quickly to improved conditions. The death rate from pulmonary tuberculosis among the Negro population was three or four times greater than that of the white population. The conditions in Washington were exceedingly alarming; and had the death rate continued to increase it would have meant the early extinction of the colored race, but with improved housing conditions they, too, have responded and we have the satisfaction of knowing that it is not simply a question of racial or physical degeneracy, but that they are the victims of bad environments and respond very promptly to improved conditions.

So I would strongly urge upon the members of the Sociological Section to look well into the housing conditions of their various communities. Perhaps one of the most efficient ways is to insist upon proper building regulations and upon legislation that will secure the condemnation of houses unfit for human habitation. It can certainly be established that such quarters are dangerous to health, and under the police powers of the State the remedy can be applied. We were engaged for five or six years in a struggle to secure such legislation for the National Capitol. The questions of State rights, constitutionality, etc., were presented by very able attorneys and even members of

the House and Senate in opposition to such legislation, but we finally succeeded in securing a law which has been very beneficial indeed in its remedial effects.

I would strongly urge that a good deal more attention be paid to this important subject. As Mr. Kingsley expressed it yesterday, perhaps it is better that we should spend more money in the prevention of the disease than in the cure, for it is alas too true that after the disease has once gained a foothold the question of a permanent cure is indeed a very grave and a very expensive one. So let us endeavor by all means at our command to look well to the removal of one of the most fundamental predisposing causes to disease, namely, bad housing conditions.

Michael M. Davis, Jr., Boston: The little that I have to contribute to the discussion will be from a different standpoint; that is, from the standpoint of one looking at the case-worker. While I am not very much concerned with case work, it does fall to my lot to organize and arrange some of it, and it seems to me that a very practical question in relation to housing and its effect on tuberculosis is to see how the problem should be dealt with by the case-worker. The question of prevention in relation to merely remedial work comes in here, because to those who are doing case-work, remedial as well as preventive service is essential. The active case exists and must be cared for. But how can we make our remedial case-work contribute directly to permanent, constant, careful work for prevention? What can we do to make our case work count for more than the case we are working with? That seems to me a practical question, one which came to my mind a couple of months ago when Mr. Nelbach asked me to speak in this discussion.

One of our workers in Boston, Miss Lucy W. Bradley, who, an arrested case herself, is one of the most efficient and devoted workers I know, ran over a year's tuberculosis cases, about five hundred in number, to see the bearing of the housing conditions as far as she could. An exact statistical study of the bearing of housing on these cases would have been impracticable. I will not present many detailed figures. In general, about 25 per cent. of the cases lived in poor housing conditions. In the practical work done with these cases, it was clearly apparent that there was much greater spread of tuberculosis in a family when housing conditions were poor than when they were favorable; that is, the number of cases developing from a given focus was very much greater among those in poor housing conditions. The studies of Dr. Lampson and Dr. Warren, of the U. S. Public Health Service, have also brought that out recently.

One very interesting point seemed to me to come forth from this survey of cases. We are frequently faced with the practical problem of moving a family out of bad housing conditions into better ones. Sometimes this can be done readily, sometimes it can only be done with great difficulty. In cases where there was well-marked lung involvement in the patient and where there had been considerable exposure of other members of the family, the trend of our cases showed that after the center of infection was removed and the inferior housing conditions were given up (i. e. the family moved to better conditions), we rarely got any more positive cases and the suspicious cases quickly cleared up. In cases, where the patient with tuberculosis was discovered under bad housing conditions, but in the early stage, and where the other members of

the family had not been exposed for very long, we very often found that even though the housing conditions were *not* changed we were able to maintain the family without further development of cases, once the infectious case had been removed; that is to say, that the survey of these cases indicated that we had at least two factors to deal with, the factor of housing and the factor of education. Of course, that is quite obvious, and yet it comes out as a very practical thing in case work; how far, given poor housing conditions, which at least for sometime it is hard to remedy, can we control the situation through persistent education of the individual members of the family? In other words, how far can we go by purely educative efforts? As I tried to indicate, with the cases I have spoken of, much depended upon the gravity of the infection and the extent of exposure.

Now, clearly, one of our primary efforts should be to remove the family from poor to better conditions, but it cannot rest merely with the individual effort. The work already referred to by Dr. Brewer and Dr. Kober interests us very greatly in Boston. Three civic tasks arise directly out of case-work:—(1) Getting the Board of Health to vacate bad premises. (2) Utilizing case-work material to turn over to a civic agency, such as an anti-tuberculosis society, which can make use of our material as educational ammunition. (3) Helping to formulate a legislative programme and then helping to fight it through. These are all features that we ought to consider as part of our responsibility in case-work.

When we look to the educative side directly, every good piece of case-work, it seems to me, should have some permanent educational result for the patient, the members of the family and the community. Our educative effort of late has been carried on largely through the dispensary and the visiting nurse. Now this work ought to be planned with one very severe test in mind, viz., are our methods such that if we had estimated how much money we needed and had gotten all of it, we would be able, through these methods, to reach 100 per cent. of the population that needs any attention to the problem of tuberculosis? In other words, it seems to me that the *100 per cent.* test is the critical and searching test we have to apply to our case-work as well as to civic problems. Are we planning our methods so that our case-work will have a direct influence on the whole broad problem of tuberculosis in our community? Methods which simply reach the few and deal with the individual case only, it seems to me are inherently faulty in that they are not contributing to the solution of the ultimate problem. Thus my final thought is that the most important contribution that properly laid-out case-work can make to the broader field of the anti-tuberculosis campaign is the constant, critical study of cases, the summarization of results, the formulation of conclusions bearing upon our local housing campaign, our anti-tuberculosis campaign, our public-health campaign. It seems to me that a certain definite fraction of the money and the time, which we spend in case-work, should be devoted to such critical study, to the formulation of conclusions, and to the tabulation of our material in such form that it shall be useful in the civic field. Whether our cases arise in sanataria, dispensaries, or visiting nursing does not matter. What does matter is that we not only do our case-work but study it, think about it, and think it *out* until it has a public as well as a personal meaning.

RELATIVE PREVALENCE OF TUBERCULOSIS UNDER GOOD AND BAD HOUSING CONDITIONS

By Charles J. Hastings, M.D.
Toronto, Ont.

A symposium on housing and its relations to tuberculosis is well timed, inasmuch as it is most important that in our efforts to stay the ravages of this disease, we familiarize ourselves with all the sources of infection and the means by which this infection gains access to the human body; and having done so, we still have the most powerful factor to consider, and that is the resisting powers of the body, natural and acquired.

Whether or not bad housing conditions play an important rôle in the increased prevalence of tuberculosis or the increase of mortality from tuberculosis, depends largely on what we mean by bad housing conditions. We may have bad housing conditions in what may be, from a structural standpoint, a very desirable dwelling. In fact it is not uncommon to find bad housing conditions, from an infective standpoint, in the best residential districts of our cities.

Bad housing conditions may be brought about in a desirable dwelling by sub-letting and consequent over-crowding, with the usual accompanying general unsanitary conditions. On the other hand, we may have bad housing conditions in houses that are structurally unsanitary, having dark rooms with no possibility for cross ventilation, built in courts and on alleys where air and sunshine find but little access. In this class may be included the basement and cellar dwellings. However, it is gratifying to know that these structurally unsanitary dwellings are being rapidly eliminated by all well-appointed Departments of Health and will, therefore, in the near future no longer have to be reckoned with.

We have all had ample evidence of the fact that tuberculosis, like all other communicable diseases, not infrequently affects the well-to-do under good housing conditions; yet it thrives best and is most prevalent among the poor, and, therefore, under bad housing conditions.

So intimately has tuberculosis been associated with bad housing that by many it is referred to as a "house disease." This synonym no doubt originated in the slums and tenement house districts of European cities and in New York in the so-called "lung blocks." This has given rise to the oft-repeated story of the crone in the doorway of a New York tenement house who, peering through the watching group, exclaimed "Seventeen!" as a coffin came down the steps into more sunlight than its occupant had ever seen in his former unclean, ill-ventilated apartment. "Eight families and this is the seventeenth brought out from that door. God do be good to us, but it is a haunted house."

While there are in all cities tenement houses and so-called homes of various kinds that are hotbeds for the spread of tuberculosis, yet there are few of these conditions in connection with any home that cannot, by educative measures, be remedied so as to overcome in a large measure these dangers. That these dwellings are hotbeds for the spread of this disease is more due to the individual than the building, hence the necessity of education.

We know that the germ of tuberculosis will only live from one to two hours in direct sunlight and only a few hours in a well-lighted room, but will live for many days in darkness, moisture, and filth. With an enlightened public the danger of infection from these homes will be much less than is generally supposed.

The past 10 years have given us a wealth of evidence in the way of statistics, showing that the death rate from all causes in one-roomed dwellings is much higher than in two-roomed dwellings, and that it is much higher in two-roomed dwellings than in three-roomed, and also in three-roomed than in four.

Then we have the result of the investigations in regard to the development of nearly 73,000 school children in Glasgow, where it was found that the average weight of the school girls living in one-roomed dwelling was 51 pounds. while the average of those living in four or more rooms was 65 pounds. In fact many statistics could be cited showing the greater mortality and morbidity under so-called bad housing conditions, and these figures have all seemed so convincing—and in fact the figures we have received from time to time from housing organizations and from investigators have been so convincing—that we have accepted them as a full and satisfactory explanation for this high mortality, and not until recently have any statistics been presented to us as to whether or not the mortality amongst these people is affected by their removal to better housing conditions. I shall not worry you with figures or statistics along this line as you are all more or less familiar with them.

In discussing the relationship of environment to disease, Dr. E. H. T. Nash, Medical Officer of Health for Wimbleton, England, by some intensive work in his city, demonstrated, to his own satisfaction and to the satisfaction of others, that we have been placing altogether too much stress on the building and not enough on the individual. He cites the instance of four streets, three of which run parallel and the fourth crosses the end at right angles. The three parallel streets run due east and west; the width of these streets is 40 feet and, with the exception of five houses, the distance between the houses is over 55 feet. The great part of the street running across the three is fronted by a large open space, the nearest house being over half a mile away. The figures which Dr. Nash uses are of course small and therefore leave greater possibilities for error. He was dealing with a population in this instance of roughly 1600 people and took the figures for the past 3 years. He first cites the general mortality and then the infant mortality. All of these people had been removed from unsanitary conditions and unsanitary homes and placed in houses on these streets of comparatively modern construction with proper sanitary conveniences, and, owing to constant house-to-house inspection, were kept in a comparatively decent condition.

In regard to the three parallel streets of houses and flats which are much the same type with good thorough ventilation, apart from the comparatively small increased proportions of persons in each tenement, one is brought face to face with the question—what produces such a striking discrepancy in the mortality rates in these houses whose conditions as regards air, space, and light are all good of their kind?

One is face to face with the facts, as Dr. Nash says, that there is something not concerned with bricks and mortar, drains or air spaces, etc., which must produce this difference, and one is brought to the conclusion that these mortalities are not the result of environment so much as the result of difference attaching to the individuals themselves.

In these investigations Dr. Nash finds that the families, in which the mortalities had been large under former conditions, continued to be large under improved conditions. He divided the streets, for convenience, into A, B, C, and D, and taking the figures of the general mortality rate for the last three years, on street A, it was 27.6; on street B, 5; on street C, 14.3; and on street D, 4 (that is per thousand of population). On examining all death rates of children under five years in the same area he found that in A the mortality was 21.1; in B, 2.5; in C, 9.1 and in D, 2 (that is per thousand births). It was quite apparent to Dr. Nash that there was something more than the house to be taken into consideration in estimating the cause of increased mortality from the different communicable diseases.

Again, Dr. L. W. Darra Mair, in his report on "Back to Back Houses" carefully corrected his figures for difference in age and sex distribution, but he failed to deal with the fact that the rent of these houses averaged 4s–6d a week, while those he compared with were 5s–6d, though in dealing with some intractable figures by Dr. Nevin of Manchester, he does say that probably important influences other than the nature of the dwelling were in operation.

It is imperative, therefore, that we specify precisely all the influences that are brought to bear in connection with bad housing conditions. Thus in Glasgow, which has 26 times as large a proportion of one-roomed tenement dwellings as Belfast and 52 times as many persons in its one-roomed tenements with 5 or more occupants, the death rate from phthisis instead of being higher is 43 per cent. lower than that of Belfast. It is clear, therefore, that the size of the dwelling or even degrees of overcrowding may be over-shadowed by the effect of other influences; and then we have the fact that although one-half the families in Berlin live in single rooms the death rates from phthisis in that city declined 45 per cent. between 1876 to 1880 and 1901 to 1903. This was just before the period of the introduction of Bismarck's measures for general social reform.

Then what effect has malnutrition on these figures? Overcrowded rooms and undernourished bodies usually go together. Dr. Darra Mair states that the mortality rates from all causes in the district investigated and the normal rate are very largely due to deaths from pulmonary diseases in the young and to diseases resulting from defective development and malnutrition.

It has now been fairly well demonstrated that if many families are placed in

good houses and nothing more done they will still continue to have high mortalities. Have we not, therefore, been placing too much stress on the house and not enough on the individual? When we make a more careful analysis of these figures and consider the influences other than dwellings, we will be in a better position to determine more specifically the rôle played by bad housing in the increased prevalence of tuberculosis.

Poverty and ignorance are the great determining factors. We are fond of emphasizing the importance of fresh air and sunshine, good food and plenty of it—and advisedly so—but is it not useless to preach fresh air where the revenue of the home is so small that it is imperative in the severe winter weather that the windows and doors be closed and that the cracks of the windows be sealed up in order to safeguard the inmates from the elements and to economize on fuel? It is useless to preach the importance of good food and plenty of it when the revenue of the home is just sufficient to keep the soul and body of the inmates of that home together. There can be no doubt whatever that morbidity rates increase in direct ratio to the squalor of the housing accommodation, but we must ask for a more scrutinizing analysis into the variety of conditions operating so that each may he given its proper value, We must not lose sight of the fact that the opinions expressed on this problem are largely due to the angle from which the investigators may be viewing it.

People live in poor houses because of cheaper rent, and when it is necessary to cut down the rent it is usually necessary to cut down the other necessaries of life, such as fuel supply, food supply, clothing, etc.

The numerous figures that we have had presented to us from time to time showing greater prevalence of tuberculosis under bad housing conditions are intensely interesting, but what effort has been made to disentangle the various factors involved? The time has come for us to be more specific in our knowledge of the quality of difference between different groups of people. Perhaps we will then find that poverty, and its next of kin—ignorance—are the primary factors, and that living in one-roomed tenements is only one of the consequences.

How much of what we have put down to bad housing may be due to poor conditions in factories and work-shops, improper building, improper ventilation, with no provision for the care of trade dust? The female death rate, which should be most strongly affected by bad housing conditions, is substantially the same for towns as for countries in spite of the terrible conditions of overcrowding. Therefore, the unsanitary conditions under which men have to work in factories, work-shops, etc., may have as much, or even more, to do with their impaired health than the rooms in which they eat and sleep.

There can be no doubt that there are such things as infected houses. In an investigation undertaken by Dr. Guerard in two wards in New York City, it was discovered that one-half of the cases occurred in 23 per cent. of the houses in which tuberculosis had been reported, and they were about 9 per cent. of all the dwellings in the ward. This again is not alone the fault of the house but the fault of the improper education of the family and the lack of disinfection of the premises by the Department of Public Health. The danger from infected walls is very small indeed as compared with the danger of

infection from person to person in these homes. The close contact which overcrowding in dwellings necessitates, is a much greater determining factor than is the infected walls or infected floors.

In considering the problem of greater prevalence of tuberculosis under bad housing conditions, we have to deal in many cases with cause and effect. Whether disease, by adding to the family expenditure and by diminishing the wage earning power, leaves less money available for rent and thus brings about the overcrowding; or whether, on the other hand, overcrowding is associated with some other conditions or conditions which are favorable to disease, are questions of vital importance in this connection.

We naturally ask ourselves then, how much of the misery in our back streets is due to one thing and how much to another? How much is due to worry? How much to dark, dusty factories? How much to improper clothing? How much to improper, insufficient, or badly cooked food? How much to general malnutrition? How much to overcrowding? How much to unsanitary privy pits? How much to drunkenness and dissipation?

In the report made by the Social Survey of the Cincinnati Anti Tuberculosis League, the conclusion arrived at was that dissipation must take the lead as the causes of increased tuberculosis in these districts.

Have we not taken too much for granted in the deductions we have made in the past in our investigations, and has not the time now come in the march of social progress when we must be more specific and debit to the various items of our list of social ills, the proportion of maladjustment due to each?

While I do not wish for a moment to under-estimate the significance of good housing conditions, yet I wish strongly to urge the necessity of a more careful analysis of the various causes of the greater prevalence of tuberculosis under bad housing conditions.

DISCUSSION ON PAPER BY DR. HASTINGS

Dr. B. Franklin Royer, Harrisburg, Pa.: It is not exactly an easy procedure to discuss a man's paper when it is presented only in abstract and deals so large with generalities. I did not realize until I began to look for material for discussion how little has been recorded in an accurate way that is worth anything in proving the relative prevalence of tuberculosis under good and bad housing conditions. As a matter of fact, we know very little about it accurately. As has just been said we are fully convinced in our own minds that bad housing does have a very definite relation to tuberculosis, but we cannot prove it statistically. Perhaps one of the very first things that we ought to do is map out a definite program of study so that we may check up against our home findings the incidence of tuberculosis and the effect of bad housing on this incidence. Some splendid work has been done, however, along these lines. Chalmers, of Glasgow, referred to by Dr. Brewer has perhaps prepared the best statistical tables checking up his general death rates and his tuberculosis death rates against the one, two, three, and four room houses in various city wards. Chalmer's work is entirely a city study and is worth a great deal so far as city conditions are concerned, but it is not

applicable so far as rural conditions are concerned. Chalmers, too, has undertaken that which most of the superficial statisticians have not done—he has made correction for the difference in birth rates in these crowded tenements and the less crowded districts with homes.

Possibly the best published recent study of housing conditions in relation to tuberculosis is a paper by Maxwell Stevenson, of Edinburgh, and read before the Royal Institute of Public Health in the Section on Tuberculosis mentioned by Dr. Brewer and known as the Robert Phillips Section on Tuberculosis. He has proven rather conclusively that in the crowded tenement sections of Edinburgh—I do not recall the names of the particular wards—there is a very decided and positive relation between the size of the house and the number of infections; but Stevenson, on the other hand, has not considered all of the factors, because he has not included the question of family income nor has he made corrections for differences in birth rates.

We have done something in Pennsylvania along the lines of accumulating material. We realize that up to the present time we have been skirmishing around the edges of the tuberculosis problem and hitting only the most readily reached high points. It is true that the death rate has dropped to such an extent that there has been a reduction in this State of about a thousand deaths per year. Well, anybody with judgment, authority, and money could propably have secured similar results. To get at the real vitals of the problem is a different matter, and as tuberculosis workers we have to face these problems squarely.

In Pennsylvania we have recently organized a State Housing Bureau. The law was passed two years ago providing for a State-wide housing organization. It applies everywhere except in one first-class city; a separate bureau provided for conditions there. We hope through the efforts of this bureau not only to make collective investigations that will be worth while, that is, investigations as to the relative incidence of tuberculosis under bad housing conditions—but at the same time make surveys which will give us the incidence under good housing conditions. We hope to take up the history of houses, similar to the Pennsylvania house quoted by Dr. Brewer, getting the history of a particular house over a period of years and tracing the family, not only during the time they lived in that house but also for a number of years afterward. I dare say it will be four or five years before American statistics will be worth much.

Some splendid work showing the effect of housing conditions on the incidence of other diseases has been done under the able guidance of Mr. Hoffman. I think that some of the charts which he has already gathered together show in a wonderfully graphic way the influence of housing conditions on measles, whooping cough, diseases which you know have a great deal to do with lowering resistance to tuberculosis.

Once a year in Pennsylvania we check up for the annual report the number of cases listed in our various dispensaries, who for some reason or other no longer attend, and at the end of the year all such cases are checked up against living conditions. We call these completed cases because they are no longer carried on our books. Out of 5741 cases that were discharged in this way

during 1914, which we find represents some 5215 families, 586 lived in one room, 1474 families lived in two rooms, 1855 in three rooms, 898 in four, and so on down:

586 families lived in one room
1474 families lived in 2 rooms
1855 families lived in 3 rooms
898 families lived in 4 rooms
371 families lived in 5 rooms
122 families lived in 6 rooms
39 families lived in 7 rooms
17 families lived in 8 rooms
34 families lived in 9 rooms
345 families lived in rooms, number not stated
Average number of rooms, 3.0

Practically all of the cases coming to a series of State dispensaries are poor people, their incomes are small. It is of some interest probably to check up against these meager statistics which I have, the income of the various families. Out of 5215 families, some 1538 of them had no source of income at all, except charity; 12 of them had a total income of less than $5 per month; 137 families had from $10 to $15 per month; 700 families from $40 to $45 per month, etc.

FAMILY INCOME—MONTHLY

Number of families	*Income*
414	Not stated
1538	No income except charity
12	Less than $5 per month
69	$5 to $10 per month
137	$10 to $15 per month
130	$15 to $20 per month
283	$20 to $25 per month
189	$25 to $30 per month
284	$30 to $36 per month
117	$35 to $40 per month
700	$40 to $45 per month
304	$45 to $50 per month
388	$50 to $55 per month
112	$55 to $60 per month
399	$60 to $65 per month
90	$65 to $70 per month
110	$70 to $75 per month
465	$75 and over per month

Total number of families, 5,215.
Average number of persons to one family, 5.7
Average monthly income of family, $46.25
Average monthly income per capita, 5.91

The average monthly income of the family was $46.25, the average income per capita—that is per member of the family, $5.91, and yet only yesterday we heard brought out in this Section that in order to sustain life, to keep the resistance of the individual up to where he might reasonably expect freedom from disease, a monthly per capita allowance must be provided of $12.55. So you see, associated with this lack of house space, must necessarily be a lack of funds to even take advantage of such housing space as is provided.

When we come to check up the final results in a study of this sort, of course, we shall have to gather material from a wide area. New York with her vast tenements would give you one picture, Pennsylvania with her wide-

spread system of homes, the single family brick cottage would give you another set of statistics. From the great plains that we have ridden over for the last few days, we should get another picture, and yet I daresay that you would find a relative incidence of tuberculosis in these little houses built on the homesteads through which we came quite as high as in the large cities. The only thing that saves them is the outdoor work. The farmer in the rural district such as you see here, or even in the Eastern States, is not as apt to die of tuberculosis as is his wife. Why? She works indoors, he takes the cure—that is he takes the fresh air part of the cure—practically eighteen hours of every twenty-four for nine months of the year. He practically hybernates during these three months, but the rest of the year he is almost all of the time out doors. The wife comes out toward spring with the usual chronic winter cough, slowly recuperating during warm weather; the children are often infected in such houses, and these children on coming into our large cities produce a very considerable amount of the tuberculosis that we find in such large cities. I fear some of the cases we attribute to bad housing conditions in our large cities are not infected there at all but are infected under conditions such as I have just referred to.

I wish it were possible to bring before you a statistical study that would be something worth while. This we cannot do until we have had further time to compile and correlate figures already in the making. We get through our 115 nurses a fairly complete sociological study of conditions in the home including everyone's income, rooms inspected, general habits about the home, etc., but it is a tremendous task to undertake the correlation of such work. In three months with careful correlation of material which we already have in our files, we might be able to give you a local picture for cosmopolitan Pennsylvania.

HOUSING AND TUBERCULOSIS

A LEGISLATIVE PROGRAM

By Lawrence Veiller

New York

It is significant that the tuberculosis workers of the country should, after 10 years of activity, begin to ask themselves whether their work would not be more rapidly advanced if they were to attack some of the basic causes of bad health and disease.

In seeking such causes it is not strange that bad housing conditions should seem to lie at the root of the situation.

Nor is it a matter of comment that those engaged in the anti-tuberculosis campaign should not have addressed their attention to this subject before now. It would indeed have been unwise at the beginning of the great movement for the prevention of tuberculosis to have sought to deal with so fundamental a factor in the prevention of disease through the improvement of the living environment of the people. The attack necessarily at the beginning could have been made only in the direct way and the initial campaign was bound to deal with the education of the public to the essential requirements of healthful and right living; to the establishment of tuberculosis hospitals and sanatoria for the treatment and cure of the sufferers; to the enlightenment of all classes in the community as to the causes of the disease and the measures to be taken to bring about a cure and to prevent its spread through the community; to preach the outdoor life, rest, higher standards, wiser personal habits, healthful recreation—in a word intelligent and sane living.

Now, after 10 years of activity, it is especially appropriate, it seems to me, for the tuberculosis workers of the country to attack bad housing conditions and to lay stress upon this element in their campaign against this disease.

For many years past we have all been asking ourselves, what shall it profit a community to send a man to a tuberculosis sanatorium for 6 months, there to be fed and cared for and administered to, watched over by physicians and nurses and taught how to take care of himself and then at the end of 6 months turn him back again into some vile slum to live under unsanitary and degrading conditions? Of course, it does *not* profit the community! Of course it is foolish for us to go on longer in this way, but we cannot end it until we unite determinedly in the fight for the abolition of the slum. So long as there are bad housing conditions existent in any of our cities, so long will people live under conditions which make for the breaking down of the physical system and the weakening of the capacity of the human body to resist the attacks of tuberculosis and other germ diseases.

So, I view with great enthusiasm the turning of the attention of the tuberculosis workers of the country to the cause of housing reform, but would utter a word of warning to those who may be inclined to embark light-heartedly upon this undertaking. Heretofore their work has been comparatively easy. It has been a work of educational propaganda; of stimulating city officials to build hospitals and develop institutions; of securing funds for the public for visiting nurses, dispensaries and other weapons in the campaign against this disease. Except in rare instances our tuberculosis workers have not been engaged in a movement which at every point directly antagonizes vested interests in the community, a movement which affects every property owner in our cities and which, affecting as it does his pocket nerve, is apt to be viewed in a totally different light by the citizen from movements which do not have that direct effect.

The housing movement, of course, like the anti-tuberculosis movement, has its educational side: There is place here too for a wide-spread and active educational propaganda, but the larger results will be found to flow through legislative action; through the enactment of wise laws and their adequate enforcement.

This subject must be viewed from two points of view—the direct and the indirect relation of bad housing conditions to tuberculosis. The direct relation will be found chiefly in the lack of light and air in places where people live and work. The indirect relation will be found in the general effect on the health of human beings caused by living under bad conditions, in lowered vitality, in the greatly reduced ability of the human system to resist disease.

Taking up first the direct relation, it is obvious that any legislative program must include the enactment of laws which will do two things:

1. Prevent the erection in the future of houses in which people are to live in which there is a single dark room, or any room improperly ventilated.

2. See to it, so far as may be practicable, that all of the existing houses built through past years be made suitable for people to live in by providing sufficient daylight and adequate ventilation.

Taking up the first proposition, it is very easy to say "Enact laws so that every house in which people live shall have adequate light and air in every room and in every part of the building," but it is not so easy to accomplish. If it could be brought about by the wave of a necromancer's wand, it would be delightful, but unfortunately legislation does not work that way. As we all know, it is a hard and stony path and in this field we have to fight for every inch of the ground.

In the first place, until recently, there have not been well accepted standards throughout the country of what constitutes proper light, or proper ventilation. We all know that the science of ventilation is very much in flux, that not only the doctors disagree, but ventilating experts disagree and that all that we learned a few years ago about carbon dioxide and cubic air space now has to be unlearned and that the important things are keeping down excessive temperature, insuring free movement of the air, and preventing too great moisture. So it is not strange that it should be only in recent years

that our legislatures have commenced to adopt laws imposing more nearly adequate standards of ventilation in the construction of dwellings. The essential thing in such laws is to secure for every room, for every hallway, and for cellars and all public parts of buildings (especially in tenement houses and similar multiple dwellings in which many families live), the greatest amount of direct outside light and air that can be secured. The only really satisfactory measure is to require every room to open either directly on the street, or on a large backyard. This, however, is a counsel of perfection. Nowhere in America has so radical a proposal been enacted into law. In most States we are under the unfortunate necessity of permitting many rooms in dwellings to secure their light and ventilation from open courts. While this is to be regretted the results are not bad if the courts are large enough to admit sufficient light and air, especially direct sunlight. Here, too, the standards set in most states have been far short of what is desirable. They represent the best that could be secured under the necessity of meeting the practical desires of legislators to conserve property interests and to meet the views and wishes of owners of realty.

I regret to say that I know of no State in the country where consideration has been given, so far as legislation is concerned, to the orientation of buildings, namely the placing of them upon the property in such way that they will receive a maximum of the direct rays of the sun—*sunshine*, as distinguished from *sunlight*. This, however, is of great importance and something that ought to be embodied in our laws.

The thing to strive for, however, is to insure sufficient light and air in all future dwellings and the way to secure this is to require every room, every hall, every cellar, and especially water-closets, to have windows of a certain minimum size bearing a certain ratio to the area of the room itself and which open directly upon the street, the yard, or an open court and then providing in the statute itself the minimum size of such yards and courts and making their width and area proportionate to the height of the building itself, for, as a building increases in height it is obvious that the open space necessary to furnish light and air to its various rooms must similarly increase. A court 6 feet in width may be adequate for a two-story building, but would not be at all adequate for an eight-story building. This has been recognized in our best laws and the sizes of the open spaces are there made proportionate to the height of the buildings.

2. *The old buildings.*—How to get light into the dark rooms in existing dwellings, especially the older and more ramshackle ones, is a very perplexing problem. It is much more difficult of solution than the problem of furnishing sufficient light and ventilation in new buildings, because the old dwellings are already there. If they have dark rooms in them, located one or two, or even three rooms away from the outer wall of the building, there is no way of bringing them to the outer wall except by tearing down the building, if I may be permitted to perpetrate such a "bull." Therefore we are compelled in such cases to adopt make-shift remedies; to content ourselves with an improvement in existing conditions; with letting in a little light and air, as much as we

can get; to tolerate for a while longer conditions that we admit and know to be bad simply because there is no way of remedying them without great expense to the community, or injustice to property owners.

The measure of relief that is most commonly adopted in such cases is to require the cutting in of partition windows as large as possible, as a rule not less than 3 feet by 5 feet in size, between adjoining rooms, thus letting the light and air from an outer room "filter" in to an inner room. This, of course, doesn't make the inner room habitable or sanitary, it only palliates conditions but it is better than nothing. The cutting in of such windows in *some* cases has worked wonders. They have "let in the light" and brought a tremendous improvement in existing conditions. Sometimes it is possible to cut a window in an outer wall over adjoining property, or where a building abuts a vacant lot. This is, of course, the best thing to do. In other cases it is possible to cut skylights in the roof and thus really furnish adequate light and ventilation to rooms on the upper floor, and in a few cases interior rooms have been lighted by means of courts or shafts cut into the building. This, however, is generally a very expensive operation, means as a rule the loss of rentable floor area, is difficult to carry out from a structural point of view and does not, as a rule, appeal to owners of realty.

All of these methods, however, must be adopted and must be embodied in our statute law, if our legislative program is to be effective.

One word of caution: Such laws should be State-wide in their application and not merely apply to the large cities. They are needed equally in small towns, in villages, in suburban areas, and even in rural districts, for the dark room is no respecter of localities. It flourishes everywhere—even on the prairies. Another important consideration is that such laws should apply to all dwellings, that is, all buildings in which human beings live, not merely to tenement houses. The need is probably greater in the multiple dwellings, but as yet in most of our States and cities, thank Heaven, the tenement is not the predominant type of building. Throughout the greater part of the country the majority of people still fortunately live in either single houses, or in two family houses. It is therefore essential that any housing laws which seek to provide light and ventilation should apply to these buildings and not be simply limited to the larger tenements. A dark room is just as dangerous in a private dwelling as it is in a tenement house.

Another important element to be borne in mind is that housing laws in themselves will be of very little value unless adequate machinery for their enforcement is provided. This, in some instances, is a very difficult question. Our public officials, especially the representatives of the people in the legislature, are very loathe to impose additional burdens upon taxpayers through the creation of new offices.

In the cities the problem is not so difficult. Here it should be possible to establish in every health department a housing bureau devoting its entire time and attention to the improvement of housing conditions and the enforcement of housing laws in that city. Except in the very largest cities like New York, and possibly Chicago, it is not necessary to create a separate branch of the city government (such as we have in New York City in the tenement

house department with its 800 employes and its annual budget of $800,000) but a separate bureau in the health department in most cities will be adequate to meet the situation.

In the small towns and villages and rural districts the question of enforcement of housing laws is full of difficulties.

I view with great hope the developments in the last few years in New York State by which the county is being developed as the unit for health work throughout the State. This to my mind means ultimately the solution of this difficult problem of the financing and control of rural health work and of the health work of the smaller communities.

This new system, with the further development that is now being prosecuted so successfully in Massachusetts, by which neighboring towns pool their health work and employ a health officer jointly for several towns, to my mind will solve the problems involved in the financing and administration of health work in the smaller communities which now in most States, seem almost insurmountable.

I have dwelt at length in this paper, and I think properly so, more upon the direct relation of bad housing to tuberculosis, that is upon the securing of light and ventilation in the habitations of the people, yet I should not feel that I had treated my subject adequately if I did not mention some of the indirect relations and to urge a place in our legislative program for the enactment of laws that will not only insure adequate light and ventilation, but will assure to every citizen decent and habitable living accommodations; that will safeguard him against the breaking down of his health, due to living in slums; that will prevent bad drainage; that will do away with damp living quarters; that will secure adequate disposal of garbage and other wastes; proper sewage disposal; prevent overcrowding; forbid the occupancy of cellar rooms—in a word, insure to the worker healthful, cheerful and sanitary surroundings.

These, of course, are but the elementary and underlying elements of a decent civilization. In a sense they are negative. They represent the minimum standards which we have a right to demand for all citizens. How far short they fall of those conditions of living which we desire for all people in America and which we think all people should have, I need not point out.

DISCUSSION ON PAPER BY MR. VEILLER

Sherman C. Kingsley, Chicago: We have heard some very excellent papers this morning and discussions on this question. I was especially interested in what Dr. Kober had to say. I wish that we had the definite data charging against different items of maladjustment their due portion of responsibility. I suppose we are tending that way somewhat, but we do, all of us, cry out for definite and positive information. I do not believe that there is any doubt, however, that we should go right on doing all we can to prevent the building of dark rooms and fighting the fight as strongly as we can against the slum, because it seems to me that the enormous prevalence of tuberculosis, among

people who live in adverse conditions and who have more than their share of the trouble is strongly indicative. It makes me think of the old German who wanted to sell a horse and he had the prospective buyer out driving with him. The man who was about to buy noticed that the hind leg on the opposite side of him had a spavin, and he said to the owner, "How is it that your horse does not limp on account of the spavin?" The old fellow was pretty honest, or pretty well cornered, and he said "Because he has a spavin on both legs." Now, these people have got all the troubles and you can hardly tell which one they die of finally.

We do know this, down at the bottom of the whole problem are the children and the babies. That is the bad part of it all. We cannot assess to the bad house its due share of the responsibility definitely, but I do not believe that we need have any hesitancy in fighting with whatever vehemence we can against bad housing conditions. I have observed this: That you do not have so very much trouble about the house problem if the people have got money to pay for a house. The big difficulty, somehow or other, is the lack of means. I will not say that is universal, because some of the very worst housing conditions I have ever encountered were where the family was trying to pay for the house they had bought; they had withdrawn to two or three rooms, and the man who was nominally owner of a house was more crowded than any one else in it.

One of the big fights is on the question of income. Then comes the question of whose business it is to pay the proper kind of income. I told you something last night about the income in a certain group of families where we have been studying the children. The incomes of these children in the open air schools was a little less than half of what our workers in the Juvenile Court of Chicago have set up as a minimum standard necessary to bring children through with promise of becoming good citizens. Now, if you go back of the income question and find these individuals whose income is less than the minimum, you get into another difficulty, because of the source of the conditions in these families. Sometimes it is illness, and sometimes illness, of course is attributable to bad housing; but there are other conditions, sometimes abnormality of mind or conduct; and we get into a perfect maze of difficulties when we try to place the responsibility for low incomes and consequent bad housing. But the great thing about it all is, I think, that we should record in our laws certain minimums, below which we will not allow a landlord or anybody else to pass. We know some of those things. We know that it is not a good thing to have a dark room in a house and compel the children to sleep in that room where the sun and the air do not enter. Dr. Kober has told us very clearly how that affects primitive races and large groups of people. That we should not allow and we should stand back of our building inspector or whoever is responsible for the law, the enforcement of the law, to the utmost extent.

I myself have been greatly helped and enlightened and strengthened by some of the discussions we have had, and I believe that the bad house is one of the things that we can set up as an archenemy and fight all along the line.

I want to say just a word about something, which does not bear exactly on this question, but which was brought up in the meeting last night. The

statement has been made to me, in relation to open air schools, that all you need to do to get an open-air school is, to throw your school house windows open. You probably have better air than you had before and they are obtaining wonderful success, I am sure, in New York with their open-window rooms. They have 250 rooms in New York schools, with a class of about 40 in a room, with open windows, and they do not feed and, I believe, do not give extra clothing. Then, they have about 50 classes where they have anaemic children, about 25 children to a teacher. Based on careful studies made a few years ago Mr. Mann says that they are getting better results with these children than if they were scattered through the usual rooms in the schoolhouses, but I want to say this in regard to the type of child that I was talking about the other night, the kind that you usually find in the open air schools of this country, the debilitated child; children from tuberculous families, from congested tenement homes, from the low income families, the undernourished, predisposed type, the conditions often all bad, for such children I do not believe you have at all done the adequate thing when you have only opened windows and have not provided for medical and nursing service, nor given consideration to the question of food and clothes and home conditions. I am for opening the windows and getting more air into the school room, but I tell you we are facing a big problem in the care of these children. We fed these children, we gave them about four hours of the doctor's time a week to a class of about 25, we gave an average of about an hour per day of the nurse's time in the school and in the home, we fed the children, we visited the home, we did all that we could for them. Only a little more than half of the group cared for made the normal gain or more for children of their age and sex. Merely raising the windows will not do all that we needed to do for these children living on a low income, with overcrowding and all that sort of thing, and it takes a whole lot of attention to save what is savable in such children. We hear this statement over and over at these meetings: "It is well known that implantations of tuberculosis take place largely in childhood." Then we have the fact of well over 100,000 deaths annually from the disease. If prevention is to be accomplished, it seems to me the place to begin is with the children and in the children of the type mentioned we have a stubborn fight. I believe in the open window, I simply want to caution against a too easy solution for the problem of the tuberculous child.

The National Association for the Study and Prevention of Tuberculosis

CONSTITUTION AND BY-LAWS

LIST OF MEMBERS

September 15, 1915

CONSTITUTION AND BY-LAWS

CONSTITUTION

Article I—Name

The name of this Society shall be The National Association for the Study and Prevention of Tuberculosis.

Article II—Objects

The objects of the Association shall be: (*a*) The study of tuberculosis in all its forms and relations; (*b*) the dissemination of knowledge concerning the causes, treatment, and prevention of tuberculosis; (*c*) the encouragement of the prevention and scientific treatment of tuberculosis.

Article III—Meetings

The meetings shall be held at such times and in such places as may be directed under the By-Laws.

BY-LAWS

Article I—Membership

This Association shall consist of three classes of members: (*a*) Members; (*b*) Life Members; (*c*) Honorary Members.

(*a*) Those persons who participated in the organization of the Association at the meeting in Philadelphia on March 28, 1904, and such persons as shall from time to time be elected by the Board of Directors shall be Members so long as they comply with the provisions of the By-Laws. The dues of Members shall be Five Dollars ($5) a year.

(*b*) Members may become Life Members upon the payment of Two Hundred Dollars ($200).

(*c*) Persons distinguished for original researches relating to tuberculosis, or eminent as sanitarians, or as philanthropists, who have given material aid in the Study and Prevention of Tuberculosis may be elected Honorary Members.

Article II—Board of Directors

Section 1. The Association shall, at its first meeting, elect a board of thirty directors, divided into five groups of six each, to serve one, two, three, four, and five years, the duration of office to be determined by lot; thereafter, retiring directors, who have served a full term of five years, shall not be eligible for re-election the year of retirement; provided, however, that this restriction shall not apply to the secretary or treasurer.

The Board of Directors may hereafter, at the annual meeting or at a special meeting of the Association, be increased to at least sixty, the additional members to be divided into groups in accordance with the provisions of the preceding paragraph of this section and subject to the same restrictions. It is furthermore provided that at least one-third of the total membership of the Board shall consist of laymen. At annual meetings succeeding the increase of the Board of Directors to a membership of sixty, twelve directors shall be elected for terms of five years, or, in case of vacancies in any of the groups, for such unexpired terms. The Board of Directors may, at its discretion, fill any or all vacancies caused by death, removal, resignation, etc., for the unexpired term, at a regular meeting of the Board, provided that proper notice specifying the vacancies to be filled be given to each member of the Board at least twenty days in advance of the meeting.

Section 2. The Board of Directors shall make its own rules; the government of the Association, the planning of work, the arrangement for meetings and congresses, and all other matters appertaining to legislation and direction shall be in its hands; committees shall have the power to execute only what is directed by the Board.

Article III—Election of Officers

The Board of Directors shall annually elect from its own number a President, two Vice-Presidents, a Secretary, and a Treasurer, who shall be the officers of the Associations as well as of the Board.

Article IV—Committees

Section 1. The Board of Directors shall appoint an Executive Committee of seven directors, of which the President and the Secretary shall be members *ex officio*, to which shall be entrusted all the executive work of the Association.

Section 2. The Board of Directors is empowered to appoint representatives on the International Committee on Tuberculosis; it shall also from time to time appoint such committees as may be necessary for scientific and educational work, and for the holding of meetings and congresses.

Article V.—Quorum

Seven Directors shall constitute a quorum of the Board of Directors.

Article VI—Meetings

There shall be at least one stated annual meeting of the Association at a time and place to be fixed by the Board of Directors. Other meetings of the Association may be called by the Board at such times as it shall deem proper. The Executive Committee shall hold stated and other meetings as may be directed by the rules of the Board of Directors.

Article VII—Moneys

The moneys received from membership dues and from all other sources shall be used for defraying the expenses of the Association, and for furthering its objects under the direction of the Board of Directors.

Article VIII—Amendment of Constitution

Propositions to amend the Constitution may be presented in writing at any meeting of the Board of Directors or of the Association; they shall be then referred to the Board of Directors for consideration and report. The Board of Directors shall report all propositions for amendment, whether submitted to it originally or by reference, at the meeting of the Association next following, when action may be taken; *provided, however*, that no proposition for amendment shall be voted upon within thirty days after its presentation, or without at least twenty days' notice of the meeting at which it is to come up for consideration, which notice shall set forth the proposed amendment in full. An affirmative vote of two-thirds the members present shall be required for adoption.

Article IX—Amendment of By-Laws

By-Laws may be amended in the same manner as the Constitution or by a two-thirds vote of the members present at a meeting of the Board of Directors, provided that in the latter case the proposition to amend has been presented in writing at a previous meeting of the Association, or of the Board of Directors, and that subsequently to such presentation twenty days' notice in writing has been given of the proposed amendment in the call for the meeting.

Article X—Advisory Council

The Advisory Council of The National Association for the Study and Prevention of Tuberculosis shall consist of:

First. Directors of the Association.

Second. Officers or representatives appointed by various recognized State associations for the prevention of tuberculosis, such representatives being required to qualify as members of the National Association, the number in any case not to exceed five.

Third. Officers or representatives of various recognized local or municipal associations for the prevention of tuberculosis, such representatives being required to qualify as members of the National Association, the number in any case not to exceed three.

Fourth. A member of the medical staff of every public hospital or sanatorium for the exclusive care of tuberculous patients, such member to be designated by the board of trustees or other authorities of the hospital or sanatorium, such representative being required to qualify as a member of the National Association.

Fifth. A representative from the board of trustees or other executive authorities of approved hospitals or sanatoria for the exclusive care of tuberculous patients, such representative being inquired to qualify as a member of the National Association.

Sixth. Representatives of irecognized, incorporated charitable societies or associations, such representatives being required to qualify as members of the National Association, the number in any case not to exceed three.

Seventh. The president or medical officer of the Health Department of any State or any city with a population of more than twenty thousand may become *ex officio* a member of the Advisory Council during his term of office.

The Advisory Council shall meet at the time of the annual meeting of the Association, and at such other times as it may be called together by the Directors or the President of the National Association. During the meetings of the National Association the Advisory Council shall have regular stated meetings at which members of the Council may bring up for discussion, or may present papers, which have been approved, bearing on the administrative control of tuberculosis, the management of hospitals and sanatoria, may make recommendations to the Board of Directors with regard to the conduct of the National Association, and other related subjects.

GEOGRAPHICAL LIST OF MEMBERS

HONORARY MEMBERS

Trudeau, Dr. Edward L., Saranac Lake.
Sternberg, Gen. George M., Washington.

LIFE MEMBERS

Blumenthal, George, New York.
Carnegie, Andrew, New York
Clark, F. A., New York
Fisk, Harvey Edward, New York
Frick, Henry C., New York
Harkness, Edward S., New York
Henszey, William P., Philadelphia
Higginson, Henry L., Boston
Knickerbacker, Mrs. H., New York
Knopf, Dr. S. Adolphus, New York
Langdon, Woodbury G., Morristown, N. J.
Lea, Henry C., Philadelphia
Lewisohn, Adolph, New York
McCormick, Cryus H., Chicago
Macy, V. Everit, New York
Maloney, Martin, Philadelphia
Marshall, Louis, New York
Mather, Samuel, Cleveland
May, Francis E., Chicago
Phipps, Henry, New York
Rockefeller, John D., New York
Schiff, Jacob H., New York
Wanamaker, Rodman, Philadelphia
Warburg, Felix M., New York

GEOGRAPHICAL LIST OF THE MEMBERS OF THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS, SEPTEMBER 15, 1915

ALABAMA

ALLEN, B. M., 303 Farley Building, Birmingham, Ala.
ANDREWS, DR. GLENN, Montgomery, Ala.
BAKER, DR. J. N., Montgomery, Ala.
CARY, DR. C. A., Alabama Polytechnic Institute, Auburn, Ala.
CLAY, MISS IDA V., Secretary, Montgomery Anti-Tuberculosis League, 403 Bell Building, Montgomery, Ala.
EAVES, REV. GEORGE, Secretary, Anti-Tuberculosis Association of Jefferson County, 311½ South 20th Street, Birmingham, Ala.
GRAHAM, JOHN Y., President, Tuscaloosa County Anti-Tuberculosis Association, Tuscaloosa, Ala.
LANGLEY, DR. ORLANDO, 514 Avenue A, Opelika, Ala.
LULL, DR. CABOT, 1004 Empire Building, Birmingham, Ala.
MCCALL, DR. DANIEL T., Mobile, Ala.
SANDERS, DR. W. H., State Health Officer, Montgomery, Ala.
THIGPEN, DR. C. A., Montgomery, Ala.
WILSON, DR. CUNNINGHAM, 1107 South 20th Street, Birmingham, Ala.

ARIZONA

BREID, DR. JACOB, United States Indian School, Phoenix, Ariz.
BRYAN, DR. W. G., Box 1192, Bisbee, Ariz.
CLARK, WILL L., Jerome, Ariz.
FLINN, DR. JOHN W., Pamsetgaaf among the Pines, Prescott, Ariz.
JAMES, DR. H. J., Medical Director, St. Luke's Home, Phoenix, Ariz.
MARDEN, DR. A. E., United States Indian School, Phoenix, Ariz.
METZGER, DR. JEREMIAH, Tucson-Arizona Sanatorium, Tucson, Ariz.
WATSON, DR. SAMUEL H., Tucson-Arizona Sanatorium, Tucson, Ariz.
WILKINSON, H. B., Phoenix, Ariz.
WILSON, DR. A. D., Prescott Cottage Sanatorium, Prescott, Ariz.
YOUNT, DR. C. E., Prescott, Ariz.

ARKANSAS

AUERBACH, MURRAY A., Secretary, Arkansas Society for the Study and Prevention of Tuberculosis, City Hall, Little Rock, Ark.
HILTON, DR. R. A., El Dorado, Ark.
STEWART, DR. JOHN, Arkansas Tuberculosis Sanatorium, Booneville, Ark.

CALIFORNIA

ALLEN, DR. H. W., 240 Stockton Street, San Francisco, Cal.
AYER, HAROLD O., 5 Westmoreland Place, Pasadena, Cal.
BAGG, DR. C. P., 1024 Arapahoe Street, Los Angeles, Cal.
BARLOW, DR. W. JARVIS, 616 Security Building, Los Angeles, Cal.
BECKETT, DR. W. W., Pacific Mutual Life Insurance Company, Los Angeles, Cal.
BETHELL, MISS CORA M., Secretary, Santa Clara County Association for the Study and Prevention of Tuberculosis, 19 South 3rd Street, San Jose, Cal.
BINE, DR. RENÉ, 350 Post Street, San Francisco, Cal.

Boice, H. S., 1355 South El Moline, Pasadena, Cal.
Bowen, William A., 1027 Title Insurance Building, Los Angeles, Cal.
Boyd, Dr. Walter M., 119½ South Spring Street, Los Angeles, Cal.
Brem, Dr. Walter V., 932 Maltman Avenue, Los Angeles, Cal.
Bridge, Dr. Norman, Temple Auditorium, 5th and Olive Streets, Los Angeles, Cal.
Briggs, Dr. Wallace A., Box 667, Sacramento, Cal.
Brooks, Dr. Stephen Driver, 543 Wilcox Building, Los Angeles, Cal.
Broome, Dr. William J., Alta, Cal.
Brown, Dr. Philip King, 350 Post Street, San Francisco, Cal.
Brown, Dr. Rexwald, Aiken Block, Santa Barbara, Cal.
Browning, Dr. Charles C., 1004 Story Building, Los Angeles, Cal.
Bush, Dr. Chesley, Colfax School for the Tuberculous, Colfax, Cal.
Byrnes, Dr. R. L., 516 East Washington Street, Los Angeles, Cal.
Canfield, A. W., 1421 Riverside Drive, Glendale, Cal.
Cheney, Dr. William Fitch, Shreve Building, San Francisco, Cal.
Claypole, Dr. Edith J., 2826 Garber Street, Berkeley, Cal.
Cochran, George I., President, Pacific Mutual Life Insurance Company, Los Angeles, Cal.
Cowley, Dr. R. H., 4261 Cleveland Avenue, San Diego, Cal.
Cox, Dr. Thomas J., Sacramento, Cal.
Cravens, John S., 1021 Trust and Savings Building, Los Angeles, Cal.
Crouse, Mrs. Otto, 1814 Western Avenue, Long Beach, Cal.
Cummings, Dr. R. S., 1002 Brockman Building, Los Angeles, Cal.
Cunningham, Dr. R. L., 616 Security Building, Los Angeles, Cal.
Cutter, E. A., Cutter Laboratory, Berkeley, Cal.
Dice, Dr. S. D., 1736 Orange Drive, Hollywood Station, Los Angeles, Cal.
Dickson, Dr. C. B., 416 Temple Auditorium, Los Angeles, Cal.
Elliott, J. M., First National Bank Building, Los Angeles, Cal.
Elmslie, Mrs. William Gray, The Ferguson House, Redlands, Cal.
Evans, Dr. George H., 133 Geary Street, San Francisco, Cal.
Faris, Dr. C. M., 1012 Eighth Street, Sacramento, Cal.
Fischer, George A., 1124 Harvard Boulevard, Los Angeles, Cal.
Fish, Dr. Joseph B., 715 Haas Building, Los Angeles, Cal.
Fly, Dr. Edward M., National City, Cal.
Forbes, Dr. Henry S., 2304 Telegraph Avenue, Berkeley, Cal.
Ford, Tod, 257 Grand Avenue, Pasadena, Cal.
Giannini, Dr. A. H., Executive Secretary, The San Francisco Association for the Study and Prevention of Tuberculosis, 1547 Jackson Street, San Francisco, Cal.
Goethe, C. M., 405 Nicolaus Building, Sacramento, Cal.
Gosney, E. S., 1011 Erie Street, Pasadena, Cal.
Griffith, Miss Alice S., 2820 Pacific Avenue, San Francisco, Cal.
Halsted, S. Hazard, Pasadena Ice Company, Pasadena, Cal.
Hand, Frank E., 818 West 18th Street, Los Angeles, Cal.
Hare, Dr. George A., 704 Griffith Building, Fresno, Cal.
Hartman, Uno, Crockett, Cal.
Hatch, Wallace, 2612 Parker Street, Berkeley, Cal.
Haynes, Dr. John R., 427 Consolidated Realty Building, Los Angeles, Cal.
Hendry, George W., 46 Clay Street, San Francisco, Cal.
Hirschfelder, Dr. J. O., 1392 Geary Street, San Francisco, Cal.
Holterhoff, G., Jr., 701 Kerckhoff Building, Los Angeles, Cal.
Howard, Dr. Burt F., State Board of Health, Sacramento, Cal.
Ilsley, Samuel M., 124 East Arrellaga Street, Santa Barbara, Cal.
King, Dr. Charles Lee, 70 South Euclid Avenue, Pasadena, Cal.
Kirschner, Dr. Harry E., 216 American National Bank Building, Monrovia, Cal.
Klotz, Dr. Walter C., The Barlow Sanatorium, Los Angeles, Cal.
Knapp, H. O., Box 312, Crockett, Cal.
Kress, Dr. George H., 240 Bradbury Building, Los Angeles, Cal.
Lissner, Dr. Henry H., 501 Lissner Building, Los Angeles, Cal.
Lyle, Dr. Annie G., 1150 Franklin Street, San Francisco, Cal.
McBride, Dr. James H., Pasadena, Cal.
Manwaring, Dr. Wilfred H., Stanford University, Cal.
Mattison, Dr. F. C. E., Chamber of Commerce Building, Pasadena, Cal.
Moffitt, Dr. Herbert C., 240 Stockton Street, San Francisco, Cal.
Moseley, Dr. Gayle G., Redlands, Cal.
Ophuls, Dr. William, Leland Stanford University Medical School, San Francisco, Cal.
Peers, Dr. Robert A., Colfax, Cal.

PENOYER, MRS. CHAUNCEY W., 2824 Scott Street, San Francisco, Cal.
PIXLEY, H. F., Corte Madera, Marin Co., Cal.
PLAYTER, MISS CHARLOTTE, S. 312 Mountain Avenue, Piedmont, Cal.
POMEROY, DR. JOHN L., 212 American National Bank Building, Monrovia, Cal.
POTTENGER, DR. F. M., Monrovia, Cal.
RIXFORD, DR. EMMET, 1795 California Street, San Francisco, Cal.
ROBINSON, HENRY M., 195 South Grand Avenue, Pasadena, Cal.
ROGERS, DR. F. L., Secretary, Long Beach Society for the Study and Prevention of Tuberculosis, 406 Long Beach National Bank Building, Long Beach, Cal.
ROSENCRANTZ, DR. ESTHER, care of Dr. N. Rosencrantz, Hearst Building, San Francisco, Cal.
ROSS, DR. JOHN W., R. F. D. 1, Pasadena, Cal.
SCRIPPS, MISS E. B., La Jolla, Cal.
SHEPARD, DR. CHARLES A., Sierra Madre, Cal.
SHERMAN, DR. HARRY M., Union Square Building, San Francisco, Cal.
SLEEPER, DR. KARL R.., Brockman Building, Los Angeles, Cal.
SMITH, DR. HARVEY, 1004 W. P. Story Building, Los Angeles, Cal.
STILLMAN, DR. STANLEY, 2101 Webster Street, San Francisco, Cal.
TATE, MISS EDYTHE L. M., Executive Secretary, California Association for the Study and Prevention of Tuberculosis, 111 Normal Hill Center, Los Angeles, Cal.
VAN ZWALUWENBURG, DR. C., Riverside, Cal.
VISSCHER, DR. L. G., 412 West 6th Street, Los Angeles, Cal.
VON ADELUNG, DR. EDWARD, Bank of Savings Building, Oakland, Cal.
WHITNEY, DR. JAMES L., 2 Sharp Place, San Francisco, Cal.
WITHINGTON, FREDERIC S., Wells Fargo Building, San Francisco, Cal.

CANADA

AMYOT, COL. GEORGE E., 45, Dorchester, Quebec, Que.
ARCHIBALD, DR. EDWARD, 160 Metcalfe Street, Montreal, Que.
ARMSTRONG, DR. G. E., 320 Mountain Street, Montreal, Que.
BARRON, S. B., Assistant Secretary, British Columbia Anti-Tuberculosis Society, 100 Empire Building, Vancouver, B. C.
BELL-IRVING, MRS. ISABEL, Treasurer, Vancouver Association for the Prevention and Relief of Tuberculosis, 530 Cambie Street, Vancouver, B. C.
BYERS, DR. J. RODDICK, St. Agathe des Monts, Que.
CAULFEILD, DR. ALFRED H., Bloor and St. Thomas Streets, Toronto, Ont.
COUILLARD, DR. J. A., Medical Superintendent, Lake Edward Sanatorium, Lake Edward, Que.
DEIMEL, FRANCIS, Deimel Linen-Mesh Comapny, 416 St. Catherine Street, W., Montreal, Que.
DOBBIE, DR. W. J., Toronto Free Hospital for Consumptives, Weston, Ont.
DUBÉ, DR. J. E., 232 Sherbrook Street, W., Montreal, Que.
DUBÉ, DR. L. F., Notre Dame du Lac, Que.
ELLIOTT, DR. J. H., 11 Spadina Road, Toronto, Ont.
FAGAN, DR. C. J., Provincial Board of Health, Victoria, B. C.
FAIRBANK, DR. C. O., Petrolia, Ont.
FARRIS, DR. H. A., White's Cove, Queen's County, N. B.
FLOCK, DR. G. MURRAY, Essex County Tuberculosis Hospital, R. R. No. 1, Kingsville, Ont.
GARRISON, DR. WILLIAM MILES, Charles Dalton Sanatorium, North Wiltshire, P. E. I.
GORDON, DR. J. K. M., Royal Ottawa Sanatorium, Ottawa, Ont.
GRENIER, DR. EUGENE, 707 St. Hubert Street, Montreal, Que.
HART, DR. WILLIAM M., 448 Ouleppelle Avenue, Winnipeg, Man.
HART, MRS. THOMAS, 2248 Angus Street, Regina, Sask.
HODGETTS, DR. CHARLES ALFRED, Commission of Conservation, Ottawa, Ont.
HOLBROOK, DR. J. H., Mountain Sanatorium, Hamilton, Ont.
IRVING, DR. R. W., Tranquille Sanatorium, Kamloops, B. C.
KENDALL, DR. W. S., Physician-in-Chief, Muskoka Sanatorium, Gravenhurst, Ont.
KLOTZ, DR. JULIUS E., 437 Albert Street, Ottawa, Ont.
MCGIBBON, D. LORNE, 201 Inspector Street, Montreal, Que.
MALLOCH, DR. A. E., 28 Duke Street, Hamilton, Ont.
MARTIN, DR. CHARLES F., The Sherbrooke, Montreal, Que.
MILLER, DR. ARTHUR FREDERICK, Provincial Sanatorium, Kentville, Nova Scotia.

MILLER, CHARLES T., 200 Victoria Road, Walkerville, Ont.
MILLMAN, DR. T., Temple Building, Toronto, Ont.
MINNS, FREDERICK S., 638 Dufferin Street, Toronto, Ont.
MONTIZAMBERT, DR. F., Public Health Department, Ottawa, Ont.
MURPHY, DR. H. H., Box 205, Kamloops, B. C.
NORMAN, DR. T. J., Edmonton, Alberta.
OGDEN, DR. W. E., 58 Avenue Road, Toronto, Ont.
PARFITT, DR. CHARLES D., Gravenhurst, Ont.
PETRIE, H. W., Front Street, West, Toronto, Ont.
PORTER, DR. GEORGE D., 162 Cerscent Road, Toronto, Ont.
PRIMROSE, DR. A., 100 College Street, Toronto, Ont.
ROUSSEAU, DR. ARTHUR, University of Laval, 2 Collins Street, Quebec, Que.
SAVARD, DR. E. M. A., Secretary, Anti-Tuberculosis League of Quebec, 133 Boulevard Langelier, Quebec, Que.
SEGAL, DR. JACOB, Mount Sinai Sanatorium, St. Agathe Des Monts, Que.
SEYMOUR, DR. M. M., Commissioner of Public Health, Regina, Sask.
SIMPSON, R. M., 216 McIntyre Block, Winnipeg, Man.
STEWART, DR. DAVID A., Ninette, Man.
STROHL, DR. ALFRED T., Montreal General Hospital, Montreal, Que.
THOMSON, WILLIAM, P. O. Box 266, Orillia, Ont.
TOWNSEND, DR. DAVID, Jordan Memorial Sanatorium, River Glade, N. B.
VROOMAN, DR. C. H., Tranquille Sanatorium, Kamloops, B. C.
WESBROOK, DR. F. F., University of British Columbia, Vancouver, B. C.

CHINA

STREET, DR. LIONEL, 25 Whangpoo Road, Shanghai, China.
TOOKER, DR. FRED J., Siangtan, Hunan, China.

COLUMBIA

DE POMBO, J. J., JR., Cartagena, Columbia.

COLORADO

ALDEN, MISS CLARA L., 1121 13th Street, Boulder, Colo.
ALEXIUS, SISTER ROSE, Glockner Sanatorium, Colorado Springs, Colo.
ARNEILL, DR. JAMES R., 506 Metropolitan Building, Denver, Colo.
BERGTOLD, DR. WILLIAM H., 1159 Race Street, Denver, Colo.
BERLIN, DR. W. C. K., 201 Symes Building, Denver, Colo.
BONNEY, DR. S. G., Stedman Building, Denver, Colo.
BURNETT, DR. CLOUGH TURRILL, Boulder, Colo.
CAMPBELL, DR. W. A., 424 North Nevada Avenue, Colorado Springs, Colo.
COLLINS, DR. MOSES, National Jewish Hospital for Consumptives, Denver, Colo.
CORWIN, DR. R. W., Minnequa Hospital, Pueblo, Colo.
DENNIS, DR. FRANK L., Colorado Springs, Colo.
EDSON, DR. CARROLL E., 305 McPhee Building, Denver, Colo.
FARRAND, DR. LIVINGSTON, President, University of Colorado, Boulder, Colo.
FLANNIGAN, CLEMENT, 1215 North Nevada Avenue, Colorado Springs, Colo.
FORSTER, DR. A. M., Cragmor Sanatorium, Colorado Springs, Colo.
GARDINER, DR. CHARLES FOX, 1112 North Cascade Avenue, Colorado Springs, Colo.
GELIEN, DR. J., 1350 Franklin Street, Denver, Colo.
GIBSON, DR. J. D., 430 Commonwealth Building, Denver, Colo.
GIESE, DR. CHARLES O., 619 Exchange National Bank Building, Colorado Springs, Colo.
GILBERT, DR. G. BURTON, 817 North Cascade Avenue, Colorado Springs, Colo.
GILBERT, DR. O. M., Boulder, Colo.
GODDARD MRS. FRANCIS W., 808 North Cascade Avenue, Colorado Springs, Colo.
GOODSON, DR. H. C., Woodmen, Colo.
HALL, DR. J. N., 452 Metropolitan Building, Denver, Colo.
HARLOW, DR. W. P., Boulder, Colo.
HILLKOWITZ, PHILIP, 302 Metropolitan Building, Denver, Colo.
HOAGLAND, DR. HENRY W., 327 North Nevada Avenue, Colorado Springs, Colo.
HOLDEN, DR. G. W., Agnes Memorial Sanatorium, Denver, Colo.

Jones, Asa T., 625 North Cascade Avenue, Colorado Springs, Colo.
Jones, Dr. Samuel Fosdick, 250 Metropolitan Building, Denver, Colo.
Levy, Dr. Robert, Metropolitan Building, Denver, Colo.
Lincoln, Dr. Cicero L., Agnes Memorial Sanatorium, Denver, Colo.
Little, Dr. Wilbur T., Cañon City, Colo.
Loomis, Dr. P. A., 323 Burns Building, Colorado Springs, Colo.
McConnell, Dr. John Francis, 818 North Cascade Avenue, Colorado Springs, Colo.
Mullin, Dr. W. V., Burns Building, Colorado Springs, Colo.
Murray, Dr. Edward J., The San Luis Valley Hospital, Alamosa, Colo.
Parsons, Dr. Stephen Tyler, 1312 Oneida Street, Denver, Colo.
Pershing, James H., 404 Equitable Building, Denver, Colo.
Phipps, Lawrence C., Denver, Colo.
Pogue, Dr. George R., Greeley, Colo.
Ramaley, Francis, University of Colorado, Boulder, Colo.
Rutledge, Dr. James A., Modern Woodmen of America Sanatorium, Woodmen, Colo.
Shardlow, Miss Lois L., 311 North Logan Avenue, Colorado Springs, Colo.
Schwatt, Dr. H., Sanatorium, Jewish Consumptives Relief Society, Edgewater, Colo.
Sewall, Dr. Henry, 1360 Vine Street, Denver, Colo.
Swan, Dr. William Howard, 20 East San Rafael Avenue, Colorado Springs, Colo.
Taussig, Dr. Arnold S., Metropolitan Building, 16th Street and Court Place, Denver, Colo.
Titsworth, F. S., 404 Equitable Building, Denver, Colo.
Wallace, Dr. Joseph F., Modern Woodmen of America Sanatorium, Woodmen, Colo.
Waring, James Johnston, 15 Stedman Building, Denver, Colo.
Watt, Dr. Henry C., 1440 North Nevada Avenue, Colorado Springs, Colo.
Webb, Dr. Gerald Bertram, 1222 North Cascade Avenue, Colorado Springs, Colo.
Whitney, Miss Mary L., Cragmor Sanatorium, Colorado Springs, Colo.
Williams, Dr. William Whitridge, Metropolitan Building, Denver, Colo.

CONNECTICUT

Arnold, Dr. E. H., 46 York Square, New Haven, Conn.
Avery, Samuel, P. 61 Woodland Street, Hartford, Conn.
Bartlett, Dr. William B., 42 High Street, Hartford, Conn.
Bates, Miss Ethel S., Secretary, Middlesex Anti-Tuberculosis Society, 22 Lawn Avenue, Middletown, Conn.
Beach, Dr. Charles C., 54 Woodland Street, Hartford, Conn.
Beecher, L. W., New Haven, Conn.
Blumer, Dr. George, 64 Trumbull Street, New Haven, Conn.
Briggs, Thomas B., R. F. D. 1, Portland, Conn.
Bronson, Miss J. C., 1198 Chapel Street, New Haven, Conn.
Bronson, Miss Margaret L., 1198 Chapel Street, New Haven, Conn.
Buckland, Edward G., New Haven, Conn.
Campbell, Dr. Hugh B., State Tuberculosis Sanatorium, Norwich, Conn.
Carmalt, Dr. William H., 261 St. Ronan Street, New Haven, Conn.
Cheney, Hon. L. R., Hartford, Conn.
Cheney, Mrs. Mary Bushnell, South Manchester, Conn.
Cox, Simon F., Superintendent, New Haven General Hospital, New Haven, Conn.
Dinnan, Dr. James B., State Tuberculosis Sanatorium, Meriden, Conn.
Ely, Mrs. John S., 51 Trumbull Street, New Haven, Conn.
English, Henry F., 38 Hillhouse Avenue, New Haven, Conn.
English, Joel L., Hartford, Conn.
Farnam, Professor Henry W., 43 Hillhouse Avenue, New Haven, Conn.
Farnham, E. D., South Windsor, Conn.
Fenn, Bruce, 129 Whitney Avenue, New Haven, Conn.
Fisher, Professor Irving, 460 Prospect Street, New Haven, Conn.
Fleck, Dr. H. W., 495 Fairfield Avenue, Bridgeport, Conn.
Ford, Dr. James S., Gaylord Farm Sanatorium, Wallingford, Conn.
Fromen, Dr. E. T., 262 Main Street, New Britain, Conn.
Godfrey, Jonathan, 128 Thompson Street, Bridgeport, Conn.
Greenway, Dr. James C., Greenwich, Conn.
Greenway, Mrs. James C., Kincraig, Greenwich, Conn.
Hillyer, Mrs. Appleton R., 91 Elm Street, Hartford, Conn.
Hitchcock, Frederick S., President, New London Anti-Tuberculosis Society, New London, Conn.

HOOKER, DR. EDWARD BEECHER, 721 Main Street, Hartford, Conn.
KELLOGG, CHARLES P., State Board of Charities, Waterbury, Conn.
KERNER, EUGENE, Secretary, Associated Charities, Waterbury, Conn.
KINGSBURY, DR. ISAAC WILLIAM, 36 Pearl Street, Hartford, Conn.
LANE, DR. J. E., 370 Edgewood Avenue, New Haven, Conn.
LYMAN, DR. DAVID R., Wallingford, Conn.
LYNCH, DR. EDWARD J., New London County State Tuberculosis Sanatorium, Norwich, Conn.
MCFARLAND, DR. D. W., Green Farms, Conn.
MCKNIGHT, DR. E. J., 110 High Street, Hartford, Conn.
MADEIRA, MISS EDITH, 37 Central Avenue, Waterbury, Conn.
MAHER, DR. STEPHEN J., 212 Orange Street, New Haven, Conn.
MARIANI, DR. NICOLA, 119 Greene Street, New Haven, Conn.
MURPHY, DR. JAMES E., Wildwood Sanatorium, Hartford, Conn.
PALMER, MRS. I. E., 326 Washington Street, Middletown, Conn.
PENDLETON, DR. WILSON, Gaylord Farm, Wallingford, Conn.
PLATT, F. G., New Britain, Conn.
PORTER, DR. WILLIAM, JR., 69 Forest Street, Hartford, Conn.
RANKINE, MRS. WILLIAM B., New Canaan, Conn.
SCHWAB, MISS H. M., Sharon, Conn.
SCHWAB, J. C., Yale Station, New Haven, Conn.
SCOFIELD, MISS JANE E., 232 Sumner Street, Stamford, Conn.
SKIFF, DR. WALTER C., 1184 Chapel Street, New Haven, Conn.
SMITH, ERNEST WALKER, 847 Main Street, Hartford, Conn.
STANDISH, DR. F. B., 310 Elm Srreet, New Haven, Conn.
STEINER, DR. WALTER R., 4 Trinity Street, Hartford, Conn.
STOCKWELL, DR. WILLIAM M., Fairfield County State Tuberculosis Sanatorium, Shelton, Conn.
STOLL, DR. HENRY FARNUM, 75 Pratt Street, Hartford, Conn.
STRAIN, JOHN D., Associated Charities, Meriden, Conn.
STROBEL, DR. JOSEPH E., State Sanatorium, Hartford, Conn.
SWAIN, DR. HENRY L. ,232 York Street, New Haven, Conn.
TOD, MRS. J. KENNEDY, Innis Arden House, Sound Beach, Conn.
ULLMAN, ISAAC M., 558 Whitney Avenue, New Haven, Conn.
WAGNER, DR. HARRY S., Hartford County State Tuberculosis Sanatorium, Hartford, Conn.
WARNER, MISS GRACE, Salisbury, Conn.
WARNER, WILLIAM A., New Haven, Conn.
WEBER, MRS. E. Y., 1160 Post Road, Stamford, Conn.
WELLS, D. H., Hartford, Conn.
WHITNEY, ELI, New Haven, Conn.
WHITTEMORE, HARRIS, Naugatuck, Conn.
WRIGHT, MRS. FRANK M., 208 Summer Street, Stamford, Conn.

CUBA

ALBO Y CABRERA, DR. EUGENIO, Neptuno 128, Altos, Havana, Cuba.
CABRERA Y BENITEZ, DR. FRANCISCO, Merced 77, Havana, Cuba.
CABRERA Y SAAVEDRA, DR. FRANCISCO, Merced 77, Havana, Cuba.
CABRERA Y SAAVEDRA, DR. JOSE, Padre Varela 50, Caibarien, Havana, Cuba.
CAPOTE, DR. FERNANDO MENDEZ, Calle 4, Entre 17, Vedado 172, Havana, Cuba.
DE CUBAS Y SERRATE, DR. JOSE, 85 7th Street, Vedado, Havana, Cuba.
DESVERNINE, DR. C. M., 52 Cuba Street, Havana, Cuba.
DUPLESSIS, DR. GUSTAVO, Lealtad 36, Havana, Cuba.
FORTUN, DR. ENRIQUE, Salud 34, Havana, Cuba.
JACOBSEN, DR. J. L., Monserrate 2, Havana, Cuba.
MARTINEZ, DR. EMILIO, Neptuno 56, Havana, Cuba.
MON, DR. RAMON GARCIA, SOL., 42, Havana, Cuba.
NUNEZ Y PALOMINO, DR. ENRIQUE, Animas 91, Havana, Cuba.
PLASENCIA, DR. LEONEL, Amargura 59, Havana, Cuba.
PRESNO, DR. JOSE A., Consulado 60, Havana, Cuba.
RIVERO, DR. FILIBERTO, Chacon, 17, Havana, Cuba.
SUAREZ, DR. MANUEL VERONA, Linea 84, Vedado, Havana, Cuba.

DELAWARE

Bissell, Miss Emily P., President, Delaware Anti-Tuberculosis Society, 1404 Franklin Street, Wilmington, Del.
Reed, Dr. Raymond C., Delaware College, Newark, Del.
Robin, Dr. Albert, 1202 Delaware Avenue, Wilmington, Del.
Springer, Dr. Harold L., Secretary, Delaware State Tuberculosis Commission, 1013 Washington Street, Wilmington, Del.
Swift, W. H., 1309 Delaware Avenue, Wilmington, Del.

DISTRICT OF COLUMBIA

Acker, Dr. George N., 913 16th Street, Washington, D. C.
Baldwin, M. W., 3000 13th Street, N. W., Washington, D. C.
Baldwin, William H., 1415 21st Street, Washington, D. C.
Barnes, Dr. Noble P., 208 Maryland Avenue, N. E., Washington, D. C.
Bicknell, Ernest P., American National Red Cross, Washington, D. C.
Blue, Dr. Rupert, Surgeon General, U. S. Public Health Service, 3 B Street, S. E., Washington, D. C.
Boardman, Miss Mabel T., 1801 P Street, Washington, D. C.
Boyd, Dr. J. C., 1621 22d Street, N. W., Washington, D. C.
Brooke, Major Roger, Jr., Medical Corps, U. S. A., Washington, D. C.
Bryan, Dr. Joseph H., 818 17th Street, Washington, D. C.
Cabaniss, Dr. George W., 1744 K Street, N. W., Washington, D. C.
Chatard, Thomas M., Metropolitan Club, Washington, D. C.
Clark, Appleton P., Jr., Union Trust Building, Washington, D. C.
Coblentz, Dr. Horace B., 1432 U Street, N. W., Washington, D. C.
Cohen, Max, 509 Seventh Street, N. W., Washington, D. C.
Craig, Capt. Charles F., Army Medical School, Washington, D. C.
Cross, Whitman, 2138 Bancroft Place, Washington, D. C.
Fricks, Dr. L. D., U. S. Public Health Service, Washington, D. C.
Gompers, Samuel, 801 G Street, Washington, D. C.
Gorgas, Col. William G., Surgeon-General, Washington, D. C.
Gwynn, Dr. William C., 1514 30th Street, Washington, D. C.
Hague, Arnold, 1724 I Street, Washington, D. C.
Hazen, Dr. H. H., The Rochambeau, Washington, D. C.
Hyde, Arthur E., 1658 Park Road, Washington, D. C.
James, Mrs. Julian, 1602 20th Street, Washington, D. C.
Jennings, Hennen 2221 Massachusetts Avenue, Washington, D. C.
Johnson, Dr. Loren B. T., 2108 16th Street, Washington, D. C.
Kober, Dr. George M., 1819 Q Street, Washington, D. C.
Lamb, Dr. Robert Scott, The Cecil, Washington, D. C.
Lathrop, Miss Julia C., Children's Bureau, Washington, D. C.
Lee, Blair, Washington, D. C.
Lee, Dr. Thomas S., 1603 19th Street, Washington, D. C.
Leupp, Hon. Frances E., 1813 16th Street, N. W., Washington, D. C.
Lisner, Abram, Corner 11th and G Streets, Washington, D. C.
McDonald, Miss Jessie C., National Cathedral School, Mt. St. Alban, Washington, D. C.
McKim, Dr. W. Duncan, 1701 18th Street, N. W., Washington, D. C.
McLaughlin, Mrs. Theodora North, 1721 Euclid Street, Washington, D. C.
Morgan, Dr. James D., 919 15th Street, N. W., Washington, D. C.
Morgan, Dr. William Gerry, The Rochambeau, Washington, D. C.
Neill, Charles P., Room 616, Woodward Building, Washington, D. C.
Newton, Mrs. Elsie Eaton, The Concord, Washington, D. C.
Parker, Henry P., 1518 Connecticut Avenue, N. W., Washington, D. C.
Pinchot, Gifford, 810 Munsey Building, Washington, D. C.
Pinchot, Mrs. James W. 1615 Rhode Island Avenue, Washington, D. C.
Price, Mrs. George T., The Toronto, 20th and P Streets, Washington, D. C.
Ramsburgh, Dr. Jesse H., The Portner, Washington, D. C.
Randolph, Dr. B. M., 20th and P Streets, N. W., Washington, D. C.
Richardson, Dr. Charles W., 1317 Connecticut Avenue, Washington, D. C.
Rives, Dr. William C., 1702 Rhode Island Avenue, Washington, D. C.
Robb, Hon. Charles H., Court of Appeals of the District of Columbia, Washington, D. C.
Robertson, Miss Georgia, 74 Kenesaw, Washington, D. C.

ROTHERMEL, JOHN J., 1400 Fairmont Street, N. W., Washington, D. C.
RUFFIN, DR. STERLING, 1335 Connecticut Avenue, Washington, D. C.
SAVILLE, MISS CATHERINE, 1420 17th Street, N. W., Washington, D. C.
SHEPHERD, MRS. A. R., 1917 Kalorama Road, Washington, D. C.
SHOEMAKER, DR. FERDINAND, Office of Indian Affairs, Washington, D. C.
SMITH, DR. ERWIN F., 1460 Belmont Street, Washington, D. C.
SOWERS, DR. WILLIAM F. M., 1707 Massachusetts Avenue, Washington, D. C.
SOWERS, DR. Z. F., 1707 Massachusetts Avenue, Washington, D. C.
STERNBERG, GEN. GEORGE M., 2005 Massachusetts Avenue, Washington, D. C.
STEWART, J. REVERDY, National Vaccine and Antitoxin Institute, Washington, D. C.
STOKES, GENERAL C. F., United States Navy, Washington, D. C.
TEWKESBURY, DR. W. D., Supt., Tuberculosis Hospital of the District of Columbia, Washington, D. C.
TUCKERMAN, MISS E., 1301 17th Street, Washington, D. C.
UFFORD, WALTER S., Secretary, Association for the Prevention of Tuberculosis of the District of Columbia, 923 H Street, N. W., Washington, D. C.
WALKER, DR. REGINALD R., 1710 H Street, Washington, D. C.
WARREN, B. S., 1341 Columbia Road, Washington, D. C.
WILSON, MRS. HUNTINGTON, 1608 K Street, N. W., Washington, D. C.
WOOD, REV. CHARLES, D.D., 2110 S Street, Washington, D. C.
WOODWARD, ROBERT S., The Dresden, Washington, D. C.
WOODWARD, S. W., 2015 Wyoming Avenue, Washington, D. C.
WOODWARD, DR. WILLIAM C., 1782 Lanier Place, N. W., Washington, D. C.

ENGLAND

OSLER, SIR WILLIAM, Oxford University, Oxford, England.

FLORIDA

CARNEGIE, MRS. I. M., Fernandina, Fla.
COACHMAN, WALTER F., P. O. Box 936, Jacksonville, Fla.
CUMMINGS, H. K., Bay Head, Fla.
GROOVER, FRANK C., 17 East Adams Street, Jacksonville, Fla.
L'ENGLE, E. J., Jacksonville, Fla.
MCGINNIS, DR. R. H., Jacksonville, Fla.
PASCHALL, EULA LEE, 301 West Chase Street, Pensacola, Fla.
PORTER, DR. JOSEPH Y., State Health Officer, Jacksonville, Fla.
STEVENS, DR. ELLEN LOWELL, 2050 Hill Street, Jacksonville, Fla.

FRANCE

MAGNIN, DR. A. J., 121 Boulevard Haussmann, Paris, France.

GEORGIA

BARKER, MISS TOMMIE DORA, Librarian, Carnegie Library, Atlanta, Ga.
CLARK, DR. M. A., Georgia Life Building, Macon, Ga.
COLEMAN, DR. THOMAS D., 505 Greene Street, Augusta, Ga.
COLLINS, DR. KATHARINE R., Georgia State Board of Health Laboratory, Atlanta, Ga.
COMEY, DR. PERLEY P., The Hill, corner Walton Way and Telfair Streets, Augusta, Ga.
FAULKNER, JAMES P., 303 Candler Building, Atlanta, Ga.
GLENN, THOMAS K., 301 Myrtle Street, Atlanta, Ga.
HARISON, DR. WILLIAM H., JR., 122 Jackson Street, Augusta, Ga.
HARRIS, PROFESSOR HENRY F., Atlanta, Ga.
HODGSON, MRS. F. G., 746 Peachtree Street, Atlanta, Ga.
JACKSON, MISS CHLOE M., R. N., 303 Candler Building, Atlanta, Ga
LOWE, MISS ROSA, Secretary, Atlanta Anti-Tuberculosis and Visiting Nurse Association, 23 East Cain Street, Atlanta, Ga.
MERRITT, DR. S. WICKES, 1111 Empire Life Building, Atlanta, Ga.
OERTEL, DR. THEODORE E., 638 Greene Street, Augusta, Ga.
PARRAMORE, DR. WILLIAM V., State Tuberculosis Sanatorium, Alto, Ga.

ROUGLIN, DR. LOUIS C., 829 Candler Building, Atlanta, Ga.
SLACK, DR. HENRY R., LaGrange, Ga.
SMITH, DR. CLAUDE A., City Hall, Atlanta, Ga.
THRASH, DR. ELMORE C., 428 Candler Building, Atlanta, Ga.
TUPMAN, MRS. EVA S., R. N., 320 Orange Street, Macon, Ga.

HAWAII

BISHOP, E. F., Care of C. Brewer and Company, Honolulu, T. H.
CARTER, GEORGE R., Honolulu, T. H.
COOKE, J. P., Care of Alexander and Baldwin, Honolulu, T. H.
RATH, JAMES A., Secretary, Anti-Tuberculosis League of Honolulu, P. O. Box 514, Honolulu, T. H.

HOLLAND

DE BLOEME, DR. P. J. L., Sanatorium "Hoog-Laren," Laren, N.-H., Holland.

HUNGARY

FEJERVARY, BARONESS L., 6 Dobrentei Utca, I Budapest, Hungary.

IDAHO

ALLEY, DR. JOHN N., Lapwai, Idaho.

ILLINOIS

Chicago (For remainder of State see below).
ABBOTT, DR. WILSON R., 3900 Sheridan Road, Chicago, Ill.
ABT, DR. ISAAC A., 4810 Kenwood Avenue, Chicago, Ill.
ALDIS, ARTHUR T., 247 Monadnock Block, Chicago, Ill.
ALLEN, BENJAMIN, 10 South Wabash Avenue, Chicago, Ill.
ALLEN, CHARLES L., 1800 Edison Building, Chicago, Ill.
ALLISON, DR. ROBERT G., Chicago Municipal Tuberculosis Sanatorium, Chicago, Ill.
APPEL, DR. EMMA MCKAY, 6842 Normal Avenue, Chicago, Ill.
ARMOUR, M. C., 1515 Corn Exchange Bank Building, Chicago, Ill.
ARMOUR, MRS. P. D., 2115 Prairie Avenue, Chicago, Ill.
BABCOCK, DR. ROBERT H., 77 East Washington Street, Chicago, Ill.
BACON, DR. C. S., 2156 Sedgwick Street, Chicago, Ill.
BARAT, DR. STEPHEN S., 9154 Commercial Avenue, Chicago, Ill.
BECK, DR. EMIL G., 2551 North Clark Street, North Halsted Station, Chicago, Ill.
BEECHER, DR. G. N., 901 North State Street, Chicago, Ill.
BEVAN, DR. ARTHUR DEAN, 2917 Michigan Avenue, Chicago, Ill.
BIESENTHAL, DR. MAX, 6045 South Park Avenue, Chicago, Ill.
BILLINGS, DR. FRANK, 122 South Michigan Boulevard, Chicago, Ill.
BLACKSTONE, MRS. T. B., 1912 Prairie Avenue, Chicago, Ill.
BLACKWOOD, DR. A. L., 9151 Commercial Avenue, Chicago, Ill.
BLAINE, MRS. EMMONS, 101 East Erie Street, Chicago, Ill.
BORLAND, MRS. JOHN JAY, 2616 Prairie Avenue, Chicago, Ill.
BRITTON, DR. JAMES A., 606 South Michigan Avenue, Chicago, Ill.
CALDWELL, DR. C. P., 4420 Michigan Boulevard, Chicago, Ill.
CAPPS, DR. JOSEPH A., 1405 People's Gas Building, Chicago, Ill.
CARUTHERS, MR. MALCOLM, 44 Banks Street, Chicago, Ill.
CASSELBERRY, DR. W. E., 15 East Washington Street, Chicago, Ill.
CHANCELLOR, DR. PHILIP S., 2732 Pine Grove Avenue, North Halsted Station, Chicago, Ill.
CONOVER, CHARLES H., 1520 North State Street, Chicago, Ill.
COON, DR. J. W., Chicago Municipal Tuberculosis Sanatorium, Chicago, Ill.
CORPER, DR. HARRY J., Municipal Tuberculosis Sanatorium, Bryn Mawr and Crawford Avenues, Chicago, Ill.
COWLES, ALFRED, Postal Telegraph Building, Chicago, Ill.
CROWDER, DR. T. R., Pullman Building, Chicago, Ill.
CROWELL, H. P., Quaker Oats Company, 1600 Railway Exchange, Chicago, Ill.
CUDAHY, E. A., 111 West Monroe Street, Chicago, Ill.

DAVIS, DR. N. S., JR., 7 West Madison Street, Chicago, Ill.
DEERING, CHARLES, International Harvester Company, Chicago, Ill.
DEERING, JAMES, 1430 Lake Shore Drive, Chicago, Ill.
DEWITT, DR. LYDIA M., University of Chicago, Chicago, Ill.
DICKER, DR. WILLARD W., 422 North Parkside Avenue, Austin, Chicago, Ill.
DICKINSON, MISS C. ETHEL, 1328 Winona Avenue, Chicago, Ill.
DOLAN, DR. J. EDWARD, Oak Forest, Chicago, Ill.
DONNELLEY, THOMAS E., 731 Plymouth Court, Chicago, Ill.
DRAKE, MISS ANNA M., 1139 Ainslie Street, Chicago, Ill.
EDKINS, E. A., 72 West Adams Street, Chicago, Ill.
EISENDRATH, DR. DANIEL N., 4840 Woodlawn Avenue, Chicago, Ill.
EVANS, DR. W. A., 906 Tribune Building, Chicago, Ill.
FARA, DR. FRANK J., 3341 West 26th Street, Chicago, Ill.
FAVILL, DR. HENRY B., 122 South Michigan Boulevard, Chicago, Ill.
FERGUSON, J. J., Swift and Company, Chicago, Ill.
FIELD, JAMES A., University of Chicago, Chicago, Ill.
FLEXNER, BERNARD, 209 East Chestnut Street, Chicago, Ill.
FOLEY, MISS EDNA L., 104 South Michigan Avenue, Chicago, Ill.
FRANKELTHAL, DR. LESTER E., 4825 Woodlawn Avenue, Chicago, Ill.
FRIEDMAN, DR. JOSEPH C., 1026 East 49th Street, Chicago, Ill.
FULMER, MISS HARRIET, 8 South Dearborn Street, Chicago, Ill.
FÜTTERER, DR. GUSTAV, 25 East Washington Street, Chicago, Ill.
GARDNER, DR. GEORGE ALBERT, 1401 East 66th Street, Chicago, Ill.
GEKLER, DR. W. A., Chicago Municipal Sanatorium, Chicago, Ill.
GOODRICH, ALBERT W., 920 Lincoln Parkway, Chicago, Ill.
GRAY, DR. ETHAN A., 2744 Pine Grove Avenue, Chicago, Ill.
HALPERIN, DR. GEORGE, 3200 Douglas Boulevard, Chicago, Ill.
HAMILL, CHARLES H., 105 West Monroe Street, Chicago, Ill.
HARVEY, DR. A. M., care of Crane Company, 836 South Michigan Avenue, Chicago, Ill.
HARVEY, DR. JAMES A., 25 East Washington Street, Chicago, Ill.
HEACOCK, DR. EDWARD M., 849 North Clark Street, Chicago, Ill.
HEKTOEN, DR. LUDWIG, 629 South Wood Street, Chicago, Ill.
HILTON, HENRY H. 2301 Prairie Avenue, Chicago, Ill.
HITT, S. M., Hillman's Department Store, Chicago, Ill.
INGALS, DR. E. FLETCHER, Monroe Building, Chicago, Ill.
ISHAM, DR. GEORGE S., 1340 North State Street, Chicago, Ill.
JOHNSON, DR. FRANK S., 2521 Prairie Avenue, Chicago, Ill.
JOHNSON, DR. WILBUR, 3101 Armitage Avenue, Chicago, Ill.
JORDAN, EDWIN O., University of Chicago, Chicago, Ill.
KEITH, MRS. EDSON, 1906 Prairie Avenue, Chicago, Ill.
KELLY, D. F., 1 North State Street, Chicago, Ill.
KENYON, DR. ELMER L., 104 South Michigan Avenue, Chicago, Ill.
KINGSLEY, SHERMAN C., 315 Plymouth Court, Chicago, Ill.
LATHROP, BRYAN, 407 South Dearborn Street, Chicago, Ill.
LATHROP, MRS. BRYAN, 120 Bellevue Place, Chicago, Ill.
LEE, BLEWETT, 135 East 11th Place, Chicago, Ill.
LIES, EUGENE T., General Superintendent, United Charities of Chicago, 167 North La Salle Street, Chicago, Ill.
LIPMAN, DR. W. H., care of Swift and Company, Employe Medical Department, Chicago, Ill.
MCCLELLAN, DR. JOHN H., 122 South Michigan Boulevard, Chicago, Ill.
MCCORMICK, CYRUS H., 50 East Huron Street, Chicago, Ill.
MCCORMICK, HAROLD, 1000 Lake Shore Drive, Chicago, Ill.
MCCORMICK, MRS. HAROLD, 1000 Lake Shore Drive, Chicago, Ill.
MCCREA, WILLIS S., 157 Michigan Avenue, Chicago, Ill.
MACK, JULIAN W., P. O. Building, Chicago, Ill.
MACKAY, MISS ROSALIND, R.N., 5417 Indiana Avenue, Chicago, Ill.
MCMICHAEL, DR. O. W., 25 East Washington Street, Chicago, Ill.
MAERHAK, DR. M. I., Chicago Municipal Tuberculosis Sanatorium, Bryn Mawr and Crawford Avenues, Chicago, Ill.
METCALF, DR. FRANK A., 5300 Prairie Avenue, Chicago, Ill.
MILLER, DR. H. C., 6049 Dorchester Avenue, Chicago, Ill.
MINNICK, JAMES, Superintendent, Chicago Tuberculosis Institute, 8 South Dearborn Street Chicago, Ill.
MOCK, DR. HARRY E., 122 Michigan Avenue, Chicago, Ill.
MORGAN, DR. WILLIAM E., 3256 Indiana Avenue, Chicago, Ill.

Mulliken, Alfred H., 725 Marquette Building, Chicago, Ill.
Murphy, Dr. John B., 3305 Michigan Avenue, Chicago, Ill.
Norcross, Dr. Edward P., 30 North Michigan Boulevard, Chicago, Ill.
O'Callaghan, Rev. Peter J., 911 South Wabash Avenue, Chicago, Ill.
Ochsner, Dr. Albert J., 2106 Sedgwick Street, Chicago, Ill.
O'Connor, J. J., 112 West Adams Street, Chicago, Ill.
Perkins, G. W., Monon Building, Chicago, Ill.
Piper, C. E., Supreme Scribe, Royal League, Chicago, Ill.
Putz, Dr. William Edward, 1852 Blue Island Avenue, Chicago, Ill.
Ranney, G. A., 1235 Astar Street, Chicago, Ill.
Richeson, Mrs. H. D., 1220 Continental Commercial National Bank Building, Chicago, Ill.
Ritter, Dr. John, 3033 Colorado Avenue, Chicago, Ill.
Rooney, Thomas E., Tribune Building, Chicago, Ill.
Rosenwald, Julius, Sears, Roebuck and Company, Chicago, Ill.
Rumsey, George D., 180 North Dearborn Street, Chicago, Ill.
Sachs, Dr. Theodore B., 25 East Washington Street, Chicago, Ill.
Sachs, Mrs. Theodore B., 41 South Central Park Avenue, Chicago, Ill.
Scudder, Mrs. Helen R., 69 Cedar Street, Chicago, Ill.
Segal, Dr. Charles, 1153 East 63d Street, Chicago, Ill.
Smith, Miss Mary R., 12 West Walton Place, Chicago, Ill.
Spalding, Mrs. Keith, 2626 Prairie Avenue, Chicago, Ill.
Sprague, A. A., 2d, Post Office Box Z, Chicago, Ill.
Stevenson, Dr. Alexander F., 104 South Michigan Avenue, Chicago, Ill.
Strawson, Mrs. Fannie G., 1829 Estes Avenue, Chicago, Ill.
Tice, Dr. Frederick, 31 North State Street, Chicago, Ill.
Tunnicliff, Dr. Ruth, 6018 Stony Island Avenue, Chicago, Ill.
Tyson, Russell, 20 East Goethe Street, Chicago, Ill.
Wagner, Dr. G. W., 677 North Clark Street, Chicago, Ill.
Ward, E. L., Union Stock Yards, Chicago, Ill.
Webster, Dr. George W., 30 North Michigan Avenue, Chicago, Ill.
Weller, Charles F., 6011 Harper Avenue, Chicago, Ill.
Wheaton, Dr. Clarence L., 2738 Pine Grove Avenue, Chicago, Ill.
Wiener, Dr. Alexander C., 32 North State Street, Chicago, Ill.
Williams, Dr. A. Wilberforce, 3408 Vernon Avenue, Chicago, Ill.
Wing, Frank E., Municipal Tuberculosis Sanitarium, North Crawford and Bryn Mawr Avenues, Chicago, Ill.
Young, Dr. George B., 710 City Hall, Chicago, Ill.

Anderson, Dr. James Le Roy, Chicago-Winfield Sanatorium, Winfield, Ill.
Baker, Mrs. Louise Lowe, 134 South La Salle Street, Aurora, Ill.
Bell, Mrs. Laird, Winnetka, Ill.
Brown, Dr. Everett, 134 West Prairie Street, Decatur, Ill.
Brown, Dr. Sanger, Kenilworth, Ill.
Butler, Mrs. Hermon B., Winnetka, Ill.
Chatfield-Taylor, H. C., Lake Forest, Ill.
Cohn, Dr. Harry, Cook County Tuberculosis Hospital, Oak Forest, Ill.
Davis, Dr. Franklin S., 712 Hamilton Boulevard, Peoria, Ill.
Doering, O. C., 325 North Oak Park Avenue, Oak Park, Ill.
Fitz-Hugh, Mrs. Carter, Lake Forest, Ill.
Graves, William C., Illinois State Board of Charities, Springfield, Ill.
Harwood, Dr. William E., 607 Taylor Street, Joliet, Ill.
Holt, Miss Ellen, Lake Forest, Ill.
Houghteling, Miss Harriet, Winnetka, Ill.
James, Philip L., Lake Forest, Ill.
Kessler, Dr. Arthur G., Cook County Tuberculosis Hospital, Oak Forest, Ill.
Kreider, Dr. George Noble, 522 Capitol Avenue, Springfield, Ill.
Lewis, Dr. J. F., Depue, Ill.
McCleery, Miss Ada Belle, Evanston Hospital, Evanston, Ill.
McEdward, Miss Winnifred, Naperville, Ill.
Miller, Dr. S. M., Peoria, Ill.
Milligan, Dr. Josephine, 610 West State Street, Jacksonville, Ill.
Minnick, Mrs. James, Riverside, Ill.
Morris, Dr. Everett, care of Cook County Infirmary, Tuberculosis Department Oak Forest, Ill.

Owens, Dr. Alfred E., Princeton, Ill.
Palmer, Dr. George Thomas, Springfield, Ill.
Pettit, Dr. J. W., Ottawa, Ill.
Pettit, Dr. Roswell T., Ottawa, Ill.
Rich, Dr. Frank D., Joliet, Ill.
Roberts, Dr. Thomas Elmer, 132 North Oak Park Avenue, Oak Park, Ill.
Sala, Dr. E. M., 1829 Fourth Avenue, Rock Island, Ill.
Soper, Clinton P., Bloomington, Ill.
Spalding, Mrs. S. J., Secretary, Livingston County Anti-Tuberculosis Society, Pontiac, Ill.
Strawson, Arthur J., Illinois State Association for the Prevention of Tuberculosis, Springfield, Ill.
Strotz, Mrs. Charles N., 365 Sheridan Road, Winnetka, Ill.
Taphorn, Dr. Gerhard, 203 East 2d Street, Alton, Ill.
Tulley, Dr. Frederick E., Executive Secretary, Madison County Anti-Tuberculosis Society, 1845 State Street, Granite City, Ill.
Turner, Dr. John W., Oak Forest, Ill.
Vawter, William A., 214 Greenwood Boulevard, Evanston, Ill.
Wallace, Dr. Jeannette C., Treasurer, Peoria Association for the Prevention of Tuberculosis, 507 Observatory Building, Peoria, Ill.
Ward, Dr. Todd P., Mount Vernon, Ill.
Watterson, Dr. W. H., Cook County Tuberculosis Hospital, Oak Forest, Ill.
Weld, Dr. Edward H., Secretary, Winnebago County Anti-Tuberculosis Association, 604 Trust Building, Rockford, Ill.

INDIANA

Beasley, Dr. T. J., Rockwood Tuberculosis Sanatorium, Danville, Ind.
Block, E. J., Assistant Secretary, Inland Steel Company, Indiana Harbor, Ind.
Burrage, Severance, President, The Indiana Association for the Study and Prevention of Tuberculosis, Indianapolis, Ind.
Butler, Amos W., 52 State House, Indianapolis, Ind.
Crull, Dr. Eric A., 309 Schmitz Building, Fort Wayne, Ind.
Ebel, Charles W., 515 Kossuth Street, Lafayette, Ind.
Fairbanks, Hon. Charles W., 1522 North Meridan Street, Indianapolis, Ind.
Harrison, Miss Veva C., Anti-Tuberculosis League, South Bend, Ind.
Hartloff, Dr. Charles W., 120 Upper 3d Street, Evansville, Ind.
Hays, J. W., Secretary, International Typographical Union, 640 Newton Claypool Building, Indianapolis, Ind.
Henry, Dr. Alfred, 416 Board of Trade Building, Indianapolis, Ind.
Hessler, Dr. Robert, 2010 High Street, Logansport, Ind.
Holliday, Mrs. J. S., 1010 North Delaware Street, Indianapolis, Ind.
Hollweg, Louis, 953 Meridian Street, Indianapolis, Ind.
Howat, Dr. W. F., 577 Hohman Street, Hammond, Ind.
Hurty, Dr. J. N., State Board of Health, Indianapolis, Ind.
Johnson, Dr. Laura M., Southern State Hospital, Evansville, Ind.
Kehrer, Mrs. Ella B., Anderson, Ind.
Kinsey, Mrs. O. P., 252 Greenwich Street, Valparaiso, Ind.
Loudenbach, Miss Elizabeth, 1224 High Street, Logansport, Ind.
McKamy, Dr. Anna I., President, Floyd County Anti-Tuberculosis Association, 1109 East Spring Street, New Albany, Ind.
Miller, Hugh T., Columbus, Ind.
Neier, Dr. Oliver C., 5402 East Washington Street, Indianapolis, Ind.
Potter, Merritt A., 1704 North Pennsylvania Street, Indianapolis, Ind.
Rumpf, A. G., The Studebaker Corporation, South Bend, Ind.
Sensenich, Dr. Roscoe L., J. M. S., Building, South Bend, Ind.
Stoops, Miss Alice P., Secretary, Pike County Anti-Tuberculosis Association, Petersburg, Ind.
Teuscher, Walter D., Corresponding Secretary, Indiana Association for the Study and Prevention of Tuberculosis, Indianapolis, Ind.
Woollen, H. M., American Central Life Insurance Company, Indianapolis, Ind.

IOWA

Fickel, R. C., Secretary, County Public Hospital for Scott County, Davenport, Iowa
Gibson, J. I., State House, Des Moines, Iowa

HOLLINGSWORTH, H. S., 219 Iowa Loan and Trust Building, Des Moines, Iowa
JUNGBLUT, DR. H. C., Tripoli, Bremer County, Iowa
KEPFORD, A. E., 5321 Shriver Street, Des Moines, Iowa
PERKINS, MRS. M. Russell, 1604 Dills Street, Burlington, Iowa
RUSSELL, DR. R. L., Sac and Fox Sanatorium, Toledo, Iowa
SCARBOROUGH, DR. H. V., Iowa Tuberculosis Sanatorium, Oakdale, Iowa
VAN EPPS, C., Iowa City, Iowa

KANSAS

COBURN, DR. CLAY E, Portsmouth Building, Kansas City, Kan.
CRUMBINE, DR. S. J., State Board of Health, Topeka, Kan.
DORSEY, DR. J. G., 105 West Donglas Avenue, Wichita, Kan.
EVERHARDY, DR. J. L., Secretary, Kansas Association for the Study and Prevention of Tuberculosis, Leavenworth, Kan.
GODARD, A. A., 1601 Boswell Ave., Topeka, Kan.
KENNEY, DR. C. S., Norton, Kan.
LERRIGO, DR. CHARLES H., President, Kansas Association on the Study and Prevention of Tuberculosis, 711 Mills Building, Topeka, Kan.
MURPHY, EDWARD E., Director, Modern Woodmen of America, Leavenworth, Kan.
NEISWANGER, MISS L. A., Social Service Hall, Lawrence, Kan.

KENTUCKY

ADLER, CYRUS L., 29th and Chestnut Streets, Louisville, Ky.
AHRENS, THEODORE, 327 West Main Street, Louisville, Ky.
BOARDMAN, MISS QUEEN W., 325 West Jefferson Street, Louisville, Ky.
BRECKINRIDGE, MRS. DESHA, 337 Linden Walk, Lexington, Ky.
CAMDEN, MISS TEVIS, Versailles, Ky.
COADY, MISS MARY K., 121 West Chestnut Street, Louisville, Ky.
COFFMAN, DR. W. H., Georgetown, Ky.
FLEXNER, DR. J. A., 948 South Second Street, Louisville, Ky.
GROOM, WILLIAM S., Secretary, The Kenton County Anti-Tuberculosis League, 2116 Eastern Avenue, Covington, Ky.
HICKS, MISS M., 614 West Main Street, Lexington, Ky.
KLEIN, ALEXANDER H., President, The Kenton County Anti-Tuberculosis League, 1014 Russsell Street, Covington, Ky.
MARTIN, MISS VIRGINIA P., Executive Secretary, Favette Tuberculosis and Visiting Nurse Association, 614 West Main Street, Lexington, Ky.
PEABODY, DR. JAMES R., The Atherton, Louisville, Ky.
PIRKEY, DR. MARION E., Waverly Hill Sanatorium, Valley Station, Ky.
SPRAGUE, DR. GEORGE P., Lexington, Ky.
STRULL, CHARLES, Secretary, Federation of Jewish Charities of Louisville, 531 South 1st Street, Louisville, Ky.
TAYLOR, COL. E. H., Frankfort, Ky.
VOORHIES, MRS. GORDON, 180 North Mill Street, Lexington, Ky.
WEAVER, MRS. CHARLES P., Kentucky Children's Receiving Home, Baxter Avenue, Louisville, Ky.
WHITE, DR. WILLIAM C., 710 Atherton Building, Louisville, Ky.
WILSON, DR. DUNNING S., 121 West Chestnut Street, Louisville, Ky.

LOUISIANA

BEL, DR. GEORGE S., 1204 Napoleon Avenue, New Orleans, La.
DUREL, DR. WALLACE J., 408 Medical Building, New Orleans, La.
EDGERTON, DR. E. OTIS, Crichton, La.
ELLIOT, DR. JOHN B., JR., 608 Maison Blanche, New Orleans, La.
MATAS, DR. RUDOLPH, 2255 St. Charles Avenue, New Orleans, La.
PATTON, DR. G. FARRAR, Secretary, Louisiana Anti-Tuberculosis League, 1309 Tulane Avenue, New Orleans, La.
WEIS, DR. JOSEPH D., 1448 Jackson Avenue, New Orleans, La.
WOLFF, SOLOMON, Camp and Gravier Streets, New Orleans, La.

MAINE

BENNET, E. H., Lubec, Me.
BEYER, HENRY G., JR., 120 Exchange Street, Portland, Me.
HILLS, DR. FREDERICK L., Box 603, Bangor, Me.

KNIGHT, MISS EDITH F., Presque Isle, Me.
NICHOLS, DR. ESTES, Maine Sanatorium, Hebron, Me.
PARMALEE, DR. WALTER W., 348 Turner Street, Auburn, Me.
PAYSON, FRANKLIN C., Union Mutual Building, Portland, Me.
PAYSON, HERBERT, 71 Bowdoin Street, Portland, Me.
POTTER, DR. H. T., Calais, Me.
PRENTISS, MRS. S. R., Elmbank, Bangor, Me.
TAYLOR, MISS MYRTLE E., Secretary, Androscoggin Anti-Tuberculosis Association, 46 Shawmut Street, Lewiston, Me.
TORSLEFF, A. J., Secretary, Maine Anti-Tuberculosis Association, Bangor, Me.
WEBBER, DR. STEPHEN E., Calais, Me.
WELCH, DR. FRANCIS J., 698 Congress Street, Portland, Me.
WOODMAN, EDWARD, 39 Exchange Street, Portland, Me.

MARYLAND

Baltimore (For remainder of State see below).
AMES, JOSEPH S., Chalcote Place, Guilford, Baltimore, Md.
ATHEY, MRS. C. N., 100 South Patterson Park Avenue, Baltimore, Md.
BARKER, DR. LEWELLYS F., 1035 North Calvert Street, Baltimore, Md.
BEEHLER, WILLIAM H., 222 West Lexington Street, Baltimore, Md.
BLOEDE, VICTOR G., Station D., Baltimore, Md.
BONAPARTE, CHARLES J., 216 St. Paul Street, Baltimore, Md.
BOUTON, EDWARD H., Roland Park, Baltimore, Md.
BRACK, DR. CHARLES EMIL, 500 East 20th Street, Baltimore, Md.
BUCKLER, DR. H. WARREN, 806 Cathedral Street, Baltimore, Md.
CARY, JOHN R., care of Cosden and Company, 1312 Munsey Building, Baltimore, Md.
CONE, DR. CLARIBEL, The Marlborough, 1701 Eutaw Place, Baltimore, Md.
COOK, MRS. GEORGE H., 1001 St. Paul Street, Baltimore, Md.
DABNEY, DR. WILLIAM M., Union Protestant Infirmary, Baltimore, Md.
EPSTEIN, JACOB, 2532 Eutaw Place, Baltimore, Md.
FINNEY, DR. J. M. F., 1300 Eutaw Place, Baltimore, Md.
FOLLIS, DR. RICHARD H., 3 East Read Street, Baltimore, Md.
FULTON, DR. JOHN S., 2211 St. Paul Street, Baltimore, Md.
FUTCHER, DR. THOMAS B., 23 West Franklin Street, Baltimore, Md.
GICHNER, DR. JOSEPH E., 1516 Madison Avenue, Baltimore, Md.
GILMAN, MISS ELIZABETH, 513 Park Avenue, Baltimore, Md.
HALSTED, DR. W. S., 1201 Eutaw Place, Baltimore, Md.
HAMBURGER, DR. LOUIS P., 1207 Eutaw Place, Baltimore, Md.
HAMMAN, DR. LOUIS V., 714 Park Avenue, Baltimore, Md.
HECHT, ALBERT S., 2408 Eutaw Place, Baltimore, Md.
HIRSCHMAN, DR. ISADORE I., 1518 Madison Avenue, Baltimore, Md.
HOCHSCHILD, MAX, care of Hochschild, Kohn and Company, Baltimore, Md.
HOLLYDAY, LAMAR, Bay View Asylum, Station J., Baltimore, Md.
HOOPPER, ROBERT L., 1208 Fidelity Building, Baltimore, Md.
HOWLAND, DR. JOHN, Johns Hopkins Hospital, Baltimore, Md.
HUNNER, DR. GUY L., 2305 St. Paul Street, Baltimore, Md.
JACOBS, DR. HENRY BARTON, 11 Mt. Vernon Place, W., Baltimore, Md.
JANEWAY, DR. T. C., Johns Hopkins Hospital, Baltimore, Md.
JONES, C. HAMPSON, 2529 St. Paul Street, Baltimore, Md.
JONES, MISS ELEANOR A. McI., 219½ East North Avenue, Baltimore, Md.
KEYSER, R. BRENT, Keyser Building, Baltimore, Md.
KNOX, DR. J. H. MASON, 211 Wendover Road, Baltimore, Md.
KOHN, LOUIS B., Howard and Lexington Streets, Baltimore, Md.
KRIEL, MRS. CHARLES G., 3042 St. Paul Street, Baltimore, Md.
LAMOTTE, MISS ELLEN N., 1123 Madison Avenue, Baltimore, Md.
LEOPOLD, DR. EUGENE J., 803 Park Avenue, Baltimore, Md.
LEVERING, MRS. JOSHUA, Merchants Mechanics National Bank Building, Baltimore, Md.
MARBURG, THEODORE, 14 Mt. Vernon Place, W., Baltimore, Md.
NEWCOMER, WALDO, National Exchange Bank, Baltimore, Md.
O'NEILL, DR. JOHN E., 2508 North Charles Street, Baltimore, Md.
PENROSE, DR. CLEMENT ANDARIESE, 21 West Mt. Royal Avenue, Baltimore, Md.
PLEASANTS, DR. J. HALL, 806 University Parkway, Baltimore, Md.
POWELL, ROBERT C., Executive Secretary, Maryland Association for the Prevention and Relief of Tuberculosis, 1301 North Charles Street, Baltimore, Md.

Robinson, Dr. Harry M., 2010 Wilkens Avenue, Baltimore, Md.
Rose, Douglas H., 10 South Street, Baltimore, Md.
Schoenewolf, John C., 818 North Carrollton Avenue, Baltimore, Md.
Singewald, Dr. Albert G., 1403 East North Avenue, Baltimore, Md.
Strouse, Elliot, Station E, Baltimore, Md.
Taylor, Mrs. Archibald H., 4 East Eager Street, Baltimore, Md.
Thayer, Dr. W. S., 406 Cathedral Street, Baltimore, Md.
Thom, DeCourcy W., 405 Maryland Trust Building, Baltimore, Md.
Thomas, Mrs. H. M., 1228 Madison Avenue, Baltimore, Md.
Todd, Dr. William J., Mt. Washington, P. O. Baltimore, Md.
Van Norman, Dr. Karl H., Johns Hopkins Hospital, Baltimore, Md.
Voshell, Jonathan K., Munsey Building, Baltimore, Md.
Webb, Mrs. George R., Garrison and Belle Avenues, Baltimore, Md.
Welch, Dr. William H., 807 St. Paul Street, Baltimore, Md.
Wilson, Dr. Gordon, 1318 North Charles Street, Baltimore, Md.
Wolman, Dr. Samuel, 2407 Madison Avenue, Baltimore, Md.
Young, Dr. Hugh H., 330 North Charles Street, Baltimore, Md.
Young, Hulbert, V.M.D., 515 North Charles Street, Baltimore, Md.

Broderick, D. I., Catonsville, Md.
Casey, Miss Nellie M., 105 South Potomac Street, Hagerstown, Md.
Claytor, Dr. W. Rivers, State Tuberculosis Sanatorium, State Sanatorium, Md.
Corkran, Mrs. B. W., Jr., 200 Goodwood Garden, Roland Park, Md.
Cullen, Dr. Victor F., Maryland Tuberculosis Sanatorium, State Sanatorium, Md.
Garrett, Robert, Charles Street and Wyndhurst Avenues, Roland Park, Md.
Hussey, Dr. R. G., 5 Upland Road, Roland Park, Md.
Kefauver, Dr. E. C., Thurmont, Md.
Murray, Dr. J. D., Elkridge, Howard County, Md.
Pearson, H. H., Jr., Rich Neck Manor, Claiborne, Md.
Schroeder, Dr. E. C., U. S. Experiment Station, Bethesda, Md.
Shoemaker, S. M., Eccleston, Md.
Shriver, Henry, 77 Washington Street, Cumberland, Md.
Sloan, Dr. Martin F., Eudowood Sanatorium, Towson, Md.
Speer, J. Ramsey, Trappe, Talbot County, Md.
Yeager, Dr. W. Howard, State Tuberculosis Sanatorium, State Sanatorium, Md.
Young, Dr. W. Howard, State Tuberculosis Sanatorium, State Sanatorium, Md.

MASSACHUSETTS

Boston (For remainder of State see below).
Arnold, Dr. H. D., 520 Commonwealth Avenue, Boston, Mass.
Bailey, Dr. Walter C., 506 Beacon Street, Boston, Mass.
Bigelow, Dr. W. S., 56 Beacon Street, Boston, Mass.
Bowditch, Alfred, 75 Bay State Road, Boston, Mass.
Bowditch, Mrs. Alfred, 75 Bay State Road, Boston, Mass.
Bowditch, Charles P., 111 Devonshire Street, Boston, Mass.
Bowditch, Dr. Henry I., 86 Bay State Road, Boston, Mass.
Bowditch, Dr. Vincent Y., 506 Beacon Street, Boston, Mass.
Brackett, Jeffrey R., 41 Marlborough Street, Boston, Mass.
Bradford, Dr. E. H., 133 Newbury Street, Boston, Mass.
Bradley, Miss Lucy W., Boston Dispensary, 25 Bennet Street, Boston, Mass.
Brooks, Mrs. Peter C., 2 Deerfield Street, Boston, Mass.
Cabot, Dr. Richard C., 190 Marlborough Street, Boston, Mass.
Cannon, Miss Ida M., Social Service Department, Massachusetts General Hospital, Boston, Mass.
Carter, Miss Nellie F., The Touraine, Boylston and Tremont Streets, Boston, Mass.
Christian, Dr. Henry A., Peter Bent Brigham Hospital, Boston, Mass.
Clapp, Dr. H. C., 419 Boylston Street, Boston, Mass.
Clark, B. Preston, P. O. Box 2682, Boston, Mass.
Clark, Mrs. B. Preston, P. O. Box 2682, Boston, Mass.
Cochrane, Alexander, P. O. Box 160, Boston, Mass.
Cranshaw, Harold B., 194 Boylston Street, Boston, Mass.
Curtis, Mrs. Charles P., 20 Commonwealth Avenue, Boston, Mass.

DOBSON, DR. LINDLEY, 706 Huntington Avenue, Boston, Mass.
FABYAN, DR. MARSHAL, 379 Commonwealth Avenue, Boston, Mass.
FITZ, DR. REGINALD H., 18 Arlington Street, Boston, Mass.
FITZPATRICK, T. B., 104 Kingston Street, Boston, Mass.
FLOYD, DR. CLEAVELAND, 246 Marlborough Street, Boston, Mass.
FORBES, J. MURRAY, 107 Commonwealth Avenue, Boston, Mass.
GOLDTHWAIT, DR. JOEL E., 372 Marlborough Street, Boston, Mass.
GRANDIN, MRS. J. L., JR., 54 The Fenway, Boston, Mass.
HAMLEN, MISS ELIZABETH P., 14 Marlboro Street, Boston, Mass.
HAWES, DR. JOHN B., 29 Gloucester Street, Boston, Mass.
HEMENWAY, AUGUSTUS, Room 905, 53 State Street, Boston, Mass.
HEMENWAY, MRS. AUGUSTUS, 273 Clarendon Street, Boston, Mass.
HIGGINSON, HENRY L., 44 State Street, Boston, Mass.
HOUGHTON, CLEMENT S., 60 State Street, Boston, Mass.
HOUGHTON, MISS ELIZABETH G., 191 Commonwealth Avenue, Boston, Mass.
HOUGHTON, DR. HENRY L., 176 Commonwealth Avenue, Boston, Mass.
HOUGHTON, DR. R. H., 308 Sumner Street, East Boston, Mass.
HYAMS, G. M., 309 Sears Building, Boston, Mass.
JACKSON, DR HENRY, 380 Marlborough Street, Boston, Mass.
JACKSON, MISS MARIAN C., 88 Marlborough Street, Boston, Mass.
JOHNSON, ARTHUR S., 253 Commonwealth Avenue, Boston, Mass.
JOHNSON, DR. F. W., 167 Newbury Street, Boston, Mass.
JOSLIN, DR. ELLIOT P., 81 Bay State Road, Boston, Mass.
KELLEY, DR. EUGENE R., State Board of Health, Boston, Mass.
LEE, JOSEPH, 101 Tremont Street, Boston, Mass.
LEE, DR. ROGER I., 99 Commonwealth Avenue, Boston, Mass.
LOCKE, DR. EDWIN A., 311 Beacon Street, Boston, Mass.
LORD, DR. F. T., 305 Beacon Street, Boston, Mass.
LORING, JUDGE WILLIAM CALEB, 2 Gloucester Street, Boston, Mass.
LORING, MRS. WILLIAM CALEB, 2 Gloucester Street, Boston, Mass.
LOWELL, MISS LUCY, The Ludlow, St. James Avenue, Boston, Mass.
MCSWEENEY, EDWARD F., 926 Tremont Building, Boston, Mass.
MAGID, SAMUEL M., 38 Howland Street, Roxbury, Boston, Mass.
MARETT, DR. W. C., Boston Consumptives' Hospital, Mattapan, Mass.
MASON, MISS E. F., 1 Walnut Street, Boston, Mass.
MASON, MISS IDA, 1 Walnut Street, Boston, Mass.
MEANS, DR. JAMES HOWARD, 196 Beacon Street, Boston, Mass.
MINOT, DR. GEORGE R., 188 Marlborough Street, Boston, Mass.
MINOT, DR. JAMES J., 188 Marlborough Street, Boston, Mass.
MORSE, DR. JOHN LOVETT, 70 Bay State Road, Boston, Mass.
MOSHER, DR. HARRIS P., 828 Beacon Street, Boston, Mass.
MURPHY, DR. TIMOTHY J., 372 Dudley Street, Boston, Mass.
OTIS, DR. EDWARD O., 381 Beacon Street, Boston, Mass.
OVERLANDER, DR. J. ELIOT, Boston Consumptives' Hospital, Mattapan, Mass.
PAGE, DR. CALVIN GATES, 128 Marlborough Street, Boston, Mass.
PARKS, F. R., Secretary, Loyal Protective Insurance Company, 585 Boylston Street, Boston, Mass.
PEABODY, HAROLD, 302 Berkeley Street, Boston, Mass.
PRATT, DR. JOSEPH H., 317 Marlborough Street, Boston, Mass.
RUSSELL, MRS. H. S., 191 Commonwealth Avenue, Boston, Mass.
RUSSELL, MRS. ROBERT S., 20 Commonwealth Avenue, Boston, Mass.
SALTONSTALL, RICHARD D., 99 Bay State Road, Boston, Mass.
SALTONSTALL, MRS. RICHARD D., 99 Bay State Road, Boston, Mass.
SCHOFIELD, MRS. W. H., 21 Commonwealth Avenue, Boston, Mass.
SEARS, MISS A. L., 85 Mt. Vernon Street, Boston, Mass.
SEARS, DR. GEORGE G., 426 Beacon Street, Boston, Mass.
SEDGWICK, PROFESSOR WILLIAM T., Massachusetts Institute of Technology, Boston, Mass.
SHATTUCK, MRS. ELIZABETH P., 135 Marlborough Street, Boston, Mass.
SHATTUCK, DR. F. C., 135 Marlborough Street, Boston, Mass.
SHATTUCK, DR. GEORGE B., 183 Beacon Street, Boston, Mass.
SHATTUCK, DR. GEORGE C., 205 Beacon Street, Boston, Mass.
SHAW, FRANCIS, 190 Beacon Street, Boston, Mass.
SHEA, DR. THOMAS B., 74 Marlborough Street, Boston, Mass.
SILSBEE, ARTHUR B., 53 State Street, Boston, Mass.
SLOCUM, MISS LAURA, Pond Street, Jamaica Plain, Boston, Mass.

Smith, Jeremiah, Jr., 84 State Street, Boston, Mass.
Smith, Professor Theobold, Harvard Medical School, Boston, Mass.
Southard, Louis C., Tremont Building, Boston, Mass.
Stone, Dr. Arthur K., 44 Fairfield St., Boston, Mass.
Stone, Nathaniel H., 614 Sears Building, Boston, Mass.
Stone, Seymour H., Executive Secretary, Boston Association for the Relief and Control of Tuberculosis, 4 Joy Street, Boston, Mass.
Sturgis, Francis S., 149 Newbury Street, Boston, Mass.
Van Da Linda, Frank, 67 Kingston Street, Boston, Mass.
Van Nostrand, A. G., P. O. Box 460, Fairhaven, Boston, Mass.
Warren, Dr. J. Collins, 58 Beacon Street, Boston, Mass.
White, Dr. James C., 259 Marlborough Street, Boston, Mass.
Williams, Dr. Francis H., 505 Beacon Street, Boston, Mass.
Winsor, Robert, Boston, Mass.

Adriance, Dr. Vanderpoel, Secretary, Williamstown Anti-Tuberculosis Association, Williamstown, Mass.
Alden, George I., 48 Queen Street, Worcester, Mass.
Allen, Bernard M., Secretary, Tuberculosis Committee of Andover, Andover, Mass.
Allen, Dr. Carl A., 16 Fairfield Avenue, Holyoke, Mass.
Ames, Mrs. James Barr, Cambridge, Mass.
Arnold, Elbert L., Secretary, City Hall, Northampton, Mass.
Bartlett, Halleck, 55 Elm Street, Worcester, Mass.
Bartlett, Dr. P. Challis, 15 Woodward Street, Newton Highlands, Mass.
Beckley, Dr. C. C., Lancaster, Mass.
Bill, Nathan D., Springfield, Mass.
Boutwell, Dr. Horace K., 39 St. Paul Street, Brookline, Mass.
Bowditch, Mrs. E. Francis, Framingham, Mass.
Bowditch, Miss Olivia Y., 187 Randolph Avenue, Milton, Mass.
Bussell, Miss Nellie E., 15 Everett Street, Cambridge, Mass.
Carter, Richard B., 239 First Street, East Cambridge, Mass.
Cass, William F., 31 Broad Street, Salem, Mass.
Chadwick, Dr. Henry D., Westfield State Sanatorium, Westfield, Mass.
Chase, Miss Alice P., 47 Baltimore Street, Lynn, Mass.
Childs, Mrs. Charles E., 81 Henshaw Avenue, Northampton, Mass.
Clark, Dr. Leonard B., 36 Sycamore Street, Waverly, Mass.
Coolidge, Dr. Sumner, Lakeville State Sanatorium, Middleboro, Mass.
Crane, Dr. Bayard T., Crane Sanatorium, Rutland, Mass.
Crocker, Mrs. Alvah, Fitchburg, Mass.
Dabney, Mrs. Harriet W., 272 Adams Street, Milton, Mass.
Darling, Dr. Eugene A., 138 Brattle Street, Cambridge, Mass.
Denny, Dr. Francis P., 111 High Street, Brookline, Mass.
Doughty, Mrs. W. H., "The Knolls," Williamstown, Mass.
Eliot, Dr. Charles W., 17 Fresh Pond Parkway, Cambridge, Mass.
Ellis, Dr. Fred W., Monson, Mass.
Farrington, Miss Elinor, 56 Bellevue Street, West Roxbury, Mass.
Flanders, Miss Miriam N., Ditson Place, Methuen, Mass.
Forbes, Mrs. J. Malcoln, 280 Adams Street, Milton, Mass.
Gage, Dr. Homer, 72 Pearl Street, Worcester, Mass.
Gannett, Rev. W. C., 13 Berkeley Street, Cambridge, Mass.
Gay, Mrs. Josephine S., Brookline, Mass.
Gifford, Dr. John H., 320 Rock Street, Fall River, Mass.
Glidden, Dr. E. W., Jr., Lakeville State Sanatorium, Middleboro, Mass.
Gordon, Mrs. Clarence E., Amherst, Mass.
Granger, Dr. F. C., Randolph, Mass.
Gray, Edward, Milton, Mass.
Griffin, Dr. Walter A., Sharon Sanatorium, Sharon, Mass.
Heywood, Miss Alice W., 61 Central Street, Gardner, Mass.
Honeij, Dr. James A., 2 Arlington Street, Cambridge, Mass.
Hyams, Miss Isabel F., 26 Wales Street, Dorchester, Mass.
Jaques, Dr. Henry P., Lenox, Mass.
Jones, Miss Amelia H., 396 County Street, New Bedford, Mass.
Lapham, Dr. George N., Massachusetts State Sanatorium, Rutland, Mass.
Lawrence, W. Appleton, 65 Thorndike Street, Lawrence, Mass.

LAWRENCE, MRS. W. APPLETON, 65 Thorndike Street, Lawrence, Mass.
LITTLE, REAR-ADMIRAL WILLIAM NELSON, Fore River Shipbuilding Company, Quincy, Mass.
LORING, MISS LOUISA P., Burn Side, Prides Crossing, Mass.
LYON, DR. JAMES A., Rutland State Sanatorium, Rutland, Mass.
MACCORISON, DR. CARL C., North Reading State Sanatorium, North Wilmington, Mass.
MCDERMOTT, DR. WILLIAM V., Secretary, Committee for the Prevention of Tuberculosis, 10 Washington Square, W., Salem, Mass.
MERRILL, MISS GRACE C., Secretary, Lawrence Anti-Tuberculosis League, 31 Jackson Street, Lawrence, Mass.
MILLET, DR. C. S., East Bridgewater, Mass.
MOORE, CHARLES S., V. S., 5 Oak Street, Danvers, Mass.
MUNFORD, MRS. B. B., Hawthorne Inn, East Gloucester, Mass.
NASON, DR. A. C., Newburyport, Mass.
NEWHART, DR. HARRY SAMUEL, North Reading State Sanatorium, North Wilmington, Mass.
OBER, DR. RALPH B., 76 Maple Street, Springfield, Mass.
PAULDING, MRS. CHARLES P., Milton, Mass.
PERCY, PROFESSOR FREDERICK B., 194 Aspenwall Avenue, Brookline, Mass.
PHIPPEN, DR. HARDY, 78 Washington Square, Salem, Mass.
PRESCOTT, MISS MARY R., 401 County Street, New Bedford, Mass.
RAND, DR. JOHN PRENTICE, 5 Benefit Street, Worcester, Mass.
REMICK, DR. SUMNER H., Clifford, Mass.
RICH, WILLIAM T., 20 Sargent Street, Newton, Mass.
RIGGS, DR. AUSTEN FOX, Stockbridge, Mass.
RIGGS, T. LAWRASON, 1 Mercer Circle, Cambridge, Mass.
RIPLEY, DR. F. J., Brockton, Mass.
ROACH, DR. ALFRED A., State Infirmary, Tewksbury, Mass.
ROSE, DR. WILLIAM H., 9 Elm Street, Worcester, Mass.
ROTCH, MRS. W. J., 427 County Street, New Bedford, Mass.
ROUNESVILLE, MRS. FRANK C., Secretary, The Attleboro Anti-Tuberculosis Society, 137-B South Main Street, Attleboro, Mass.
SABINE, DR. GEORGE K., 30 Irving Street, Brookline, Mass.
SCHADT, DR. GEORGE L., 423 Main Street, Springfield, Mass.
SCHLESINGER, MRS. B., Warren Street, Brookline, Mass.
SMITH, MRS. MABEL GREELEY, 689 Massachusetts Avenue, Cambridge, Mass.
STICK, DR. H. LOUIS, Box 1178, Worcester, Mass.
STOCKPOLE, MARKHAM W., Andover, Mass.
STOHN, CARL, Hyde Park, Boston, Mass.
SWAN, DR. WILLIAM D., 167 Brattle Street, Cambridge, Mass.
THACHER, MISS MARGARET W., 69 Alleghany Street, Roxbury, Mass.
THAYER, JOHN E., Lancaster, Mass.
THAYER, MRS. JOHN E., Lancaster, Mass.
THOMPSON, DR. GEORGE H., North Adams, Mass.
TOWER, MISS ELLEN M., Lexington, Mass.
TOWNSEND, MISS ANNIE R., Secretary, Brookline Anti-Tuberculosis Society, 9 Irving Street, Brookline, Mass.
UNDERWOOD, DR. GEORGE B., 105 Central Street, Gardner, Mass.
WASHBURN, DR. ELLIOTT, Rutland State Sanatorium, Rutland, Mass.
WEIR, MISS MARGARET G., 78 High Street, Newburyport, Mass.
WHEELER, MRS. W. MORTON, 34 Alveston Street, Jamaica Plain, Mass.
WINCHESTER, DR. J. F., Lawrence, Mass.
WOODWARD, DR. S. B., 58 Pearl Street, Worcester, Mass.
WRIGHT, MRS. VERNON A., Ox Bow Road, South Lincoln, Mass.

MICHIGAN

APTED, DR. RALPH C., Board of Health, Grand Rapids, Mich.
BISSELL, M. R., JR., 31 Morris Avenue, Grand Rapids, Mich.
BOWLES, MISS FLORENCE E., 32 Warren Avenue, West, Detroit, Mich.
BRENTON, DR. S., 121 West Alexandrine Avenue, Detroit, Mich.
BUFFETT, MRS. C. D., Executive Secretary, Anti-Tuberculosis Society of Cadillac, Mich., Cadillac, Mich.
COIT, A. M., 2650 Lakeview Avenue, Detroit, Mich.
DE KLEINE, DR. WILLIAM, care State Board of Health, Lansing, Mich.
DENANCREDE, DR. C. B. G., 14 Cutting Apartments, Ann Arbor, Mich.

Dickinson, W. W., Hadleigh Hill Farm, St. Joseph, Mich.
Diggins, Mrs. D. F., 118 Shelby Street, Cadillac, Mich.
Dodge, Mrs. John F., 43 Boston Boulevard, Detroit, Mich.
Dyar, Miss Clara E., Grosse Point Farms, Detroit, Mich.
Fischer, Dr. Arthur F., Box 218, Hancock, Mich.
Fisher, Miss Florence E., Tuberculosis Sanatorium, Grand Rapids, Mich.
Godwin, Arthur M., Grand Rapids Savings Bank, Grand Rapids, Mich.
Hall, Dr. Freeman, 313 Press Building, Kalamazoo, Mich.
Hartz, Dr. Henry Jasper, 617 D. Whitney Building, Detroit, Mich.
Hendrikson, Mrs. J. F., Executive Secretary, The Grand Rapids Anti-Tuberculosis Society, 55 Barclay Avenue, Grand Rapids, Mich.
Herman, Raphael, 236 Fort Street, W., Detroit, Mich.
Hewlett, Dr. Albion W., Ann Arbor, Mich.
Houghton, Dr. E. Mark, 130 Longfellow Avenue, Detroit, Mich.
Jennings, Dr. Charles G., 435 Jefferson Avenue, Detroit, Mich.
Johnston, Dr. Collins H., Metz Block, Grand Rapids, Mich.
Kahn, Dr. Moses, Eloise Infirmary, Eloise, Mich.
Kellog, Dr. J. H., Battle Creek, Mich.
Kelsey, Professor Francis W., University of Michigan, Ann Arbor, Mich.
Kent, A. D., 622 State Street, St. Joseph, Mich.
Knappen, Hon. Loyal E., Grand Rapids, Mich.
Leenhouts, Dr. A., Holland, Mich.
LeRoy, Mrs. A. M., Manistique, Mich.
Loud, H. K., Charles, Mackinac County, Mich.
Nichols, Miss Lillian I., 317 North Fayette Street, Saginaw, Mich.
Parker, Dr. Walter R., 1025 David Whitney Building, Detroit, Mich.
Parker, Mrs. Walter R., 285 Seminole Avenue, Detroit, Mich.
Peters, Charles H., 130 North 6th Street, Saginaw, Mich.
Pierce, Dr. Eugene B., Howell, Mich.
Pomeroy, Miss S. Ada., Kalamazoo, Mich.
Pope, Willard, 37 Putnam Avenue, Detroit, Mich.
Pritchard, Dr. J. Stuart, Battle Creek, Mich.
Rich, Dr. Herbert M., 1337 David Whitney Building, Detroit, Mich.
Schemm, Miss Henrietta M., 603 North Michigan Avenue, Saginaw, W., Mich.
Shankwiler, Dr. R. A., Detroit Tuberculosis Sanatorium, Detroit, Mich.
Shurly, Dr. Burt, R., Shurly Building, Detroit, Mich.
Smith, Mrs. Wallis Craig, 525 North Michigan Avenue, Saginaw, Mich.
Smith, W. J., Old National Bank, Battle Creek, Mich.
Sullivan, Miss Lucy, Executive Secretary, Kalamazoo Anti-Tuberculosis Society, Public Library, Kalamazoo, Mich.
Van Syckle, Miss Maude, 512 Kresge Building, Detroit, Mich.
Vaughan, Dr. Victor C., Ann Arbor, Mich.
Vaughan, Dr. V. C., Jr., 10th Floor, Kresge Building, Detroit, Mich.
Walton, Miss Carol F., Secretary, Michigan Association for the Prevention and Relief of Tuberculosis, Ann Arbor, Mich.
Wile, Dr. Udo J., Ann Arbor, Mich.
Ziwet, Professor Alexander, University of Michigan, Ann Arbor, Mich.

MINNESOTA

Anneke, Percy S., 1801 East Second Street, Duluth, Minn.
Beach, Dr. George William, Minnesota State Sanatorium, State Sanatorium, Cass County, Minn.
Benjamin, Paul L., Secretary, Anti-Tuberculosis Committee of the Minneapolis Associated Charities, 25 Old Chamber of Commerce, Minneapolis, Minn.
Bosworth, Dr. Robinson, Executive Secretary, State Advisory Sanatorium Commission, 824 Lowry Building, St. Paul, Minn.
Bracken, Dr. H. M., 1010 Fourth Street, S. E., Minneapolis, Minn.
Bruno, Frank J., 25 Old Chamber of Commerce, Minneapolis, Minn.
Chesley, Dr. A. J., State Board of Health, Minneapolis, Minn.
Christian, Mrs. George H., 404 South 8th Street, Minneapolis, Minn.
Countryman, Miss Gratia A., Librarian Public Library, Minneapolis, Minn.
Crosby, Miss Caroline M., 250 17th Avenue, N., Minneapolis, Minn.
Crosby, John, Minneapolis, Minn.

DAUGHERTY, DR. EDWIN B., 242 Lowry Building, St. Paul, Minn.
DUNSMORE, DR. F. A., 100 Andrus Building, Minneapolis, Minn.
GALE, E. C., 800 Security Bank Building, Minneapolis, Minn.
GRAY, GEORGE A., 2122 Woodland Avenue, Duluth, Minn.
GREENE, DR. CHARLES LYMAN, 150 Lowry Arcade, St. Paul., Minn.
HEGARDT, W. G., 1708 East 1st Street, Duluth, Minn.
HENSLIN, A. E., LeRoy, Minn.
HILL, DR. H. W., Old Capitol, St. Paul, Minn.
HILL, JAMES J., Great Northern Railway Company, St. Paul, Minn.
HOFFMAN, GEORGE B., State Hospital, Rochester, Minn.
HUTTON, MAJOR PAUL C., Fort Snelling, Minn.
JONES, DR. W. A., 513 Pillsbury Building, Minneapolis, Minn.
KELLER, MISS LYDIA H., R. N., Northfield, Minn.
KIRKWOOD, DR. R. C., State Sanatorium, Cass County, Minn.
LAIRD, DR. ARTHUR T., Nopeming, Minn.
LOWRY, HORACE, 1821 Logan Avenue, South, Minneapolis, Minn.
LOWRY, KATE S., 1821 Logan Avenue, South, Minneapolis, Minn.
LOWRY, MRS. THOMAS, 2 Groveland Terrace, Minneapolis, Minn.
LYON, DR. E. P., University of Minnesota, Minn.
MCMILLAN, H. S., 1980 Grand Avenue, St. Paul, Minn.
MARCLEY, DR. WALTER J., Nicollet Avenue and Ninth Street, Minneapolis, Minn.
MAYO, DR. C. H., Rochester, Minn.
MORE, DR. CHARLES W., Eveleth, Minn.
MURPHY, DR. IGNATIUS J., Executive Secretary, Minnesota Public Health Association, Old Capitol Building, St. Paul, Minn.
NEWMAN, DR. G. A., Prison Hospital, Stillwater, Minn.
NORTON, MRS. E. E., Breckenridge, Minn.
OHLINGER, DR. L. B., 1250 West 4th Street, Rochester, Minn.
PAINE, F. W., 706 Sellwood Building, Duluth, Minn.
PATERSON, MISS MINNIE F., 25 Old Chamber of Commerce, Minneapolis, Minn.
ROBINSON, DR. L. S. B., State Sanatorium, Cass County, Minn.
ROSENOW, DR. EDWARD C., care of Mayo Clinic, Rochester, Minn.
SLOCUM, HAROLD W., 25 Old Chamber of Commerce, Minneapolis, Minn.
SWENSEN, L. S., 1720 Third Avenue, S., Minneapolis, Minn.
SWENSON, HAROLD, New London, Minn.
TAYLOR, DR. H. LONGSTREET, 810 Lowry Building, St. Paul, Minn.
TELIN, MRS. P. W., New York Mills, Minn.
WADE, E. M., Division of Preventable Diseases, State Board of Health, University Campus, Minneapolis, Minn.
WHITE, DR. S. MARX, 704 Pillsbury Building, Minneapolis, Minn.
ZONNE, A. E., Minneapolis, Minn.

MISSISSIPPI

PORTER, DR. WILLIAM, Ocean Springs, Miss.
WAGNER, MISS H. C., Locust Hill, Water Valley, Miss.

MISSOURI

BIXBY, W. K., St. Louis, Mo.
DEACON, A. R., Lambert Pharmacal Company, 2101 Locust Street, St. Louis, Mo.
DOCK, DR. GEORGE, 600 South Kingshighway, St. Louis, Mo.
DORSEY, MISS NANCY L., 2137 South 6th Street, St. Joseph, Mo.
ENGLISH, DR. CARLOS C., Missouri State Sanatorium, Mt. Vernon, Mo.
FISCHEL, DR. WALTER, Humboldt Building, St. Louis, Mo.
FRANCIS, HON. DAVID R., 214 North Fourth Street, St. Louis, Mo.
GEBHART, DR. OLIVER C., Secretary, Buchanan County Society for the Relief and Prevention of Tuberculosis, King Hill Building, St. Joseph, Mo.
HALL, DR. JOHN R., Marshall, Mo.
JONES, A. W., JR., 911 Locust Street, St. Louis, Mo.
KNOTT, DR. MINERVA, 210 West 6th Street, Sedalia, Mo.
LONG, R. A., R. A. Long Building, Kansas City, Mo.
MC KECHNIE, MISS MARY M., Treasurer, St. Luke's Hospital, St. Louis, Mo.
MARDORF, DR. W. C., 2136 South Grand Avenue, St. Louis, Mo.
MILLER, DR. W. MCN., 800 Broadway, Columbia, Mo.

Mudd, Dr. Harvey G., 408 Humboldt Building, St. Louis, Mo.
Ravenel, Dr. Mazÿck P., Department of Bacteriology, University of Missouri, Columbia, Mo.
Saunders, Dr. E. W., 1541 South Grand Avenue, St. Louis, Mo.
Schauffler, Dr. E. W., 317 Argyle Building, Kansas City, Mo.
Tuholske, Dr. Hermann, 453 North Taylor Avenue, St. Louis, Mo.
Volker, William, 308 West 8th Street, Kansas City, Mo.

MONTANA

Campbell, Dr. Donald, Murray Hospital, Butte, Mont.
Cogswell, Dr. W. F., Secretary, Department of Public Health, Helena, Mont.
Hyde, Dr. Marie M., 405 Main Street, Miles City, Mont.
Sievers, Dr. J. R. E., 77 Owsley Block, Butte, Mont.
Sullivan, Dr. J. B., Butte, Mont.
Walters, Dr. William A., Billings, Mont.
Witherspoon, Dr. T. C., Butte, Mont.

NEBRASKA

Bailey, Dr. Benjamin F., 204 Burr Block, Lincoln, Neb.
Edholm, Mrs. K. R. J., 116 South 36th Street, Omaha, Neb.
Gifford, Dr. Harold, 420 South 36th Street, Omaha, Neb.
Hart, Charles K., Prosser, Neb.
Jonas, Dr. A. F., Brandus Building, Omaha, Neb.
Lord, Dr. John P., 830 City National Bank Building, Omaha, Neb.
Neville, M. Keith, North Platte, Neb.
Stuff, Miss Lillian B., Wise Memorial Hospital, Omaha, Neb.
Van der Slice, Dr. E. R., Kearney, Neb.
Wattles, G. W., Omaha, Neb.
Ziegler, Dr. Charles H., Vesta, Neb.

NEVADA

Mullin, Dr. R. H., The Hygienic Laboratory, University of Nevada, Reno, Nev.

NEW HAMPSHIRE

Chalmers, Thomas, 1197 Union Street, Mancester, N. H.
Clarke, Dr. George Haven, 102 Pleasant Street, Concord, N. H.
Cross, Dr. Ernest S., Randolph, N. H.
Foot, Dr. N. C., Dublin, N. H.
Kaufman, Mrs. Elizabeth Cheney, Petersborough, N. H.
Kerr, Dr. Robert B., Pembroke Sanatorium, Concord, N. H.
Upham, Dr. Samuel R., Claremont, N. H.
Watson, Dr. Irving A., Concord, N. H.
Wise, Dr. John M., N. H. State Sanatorium, Glencliffe, N. H.

NEW JERSEY

Adriance, Rev. Harris Ely, Englewood, N. J.
Baudendistel, V., 729 Polk Street, West New York, N. J.
Bingham, Mrs. Annie F., Summit, N. J.
Blanchard, Miss Iva Verne, Mercer County Tuberculosis and Sanitation League, Trenton, N. J.
Borden, Alfred, Short Hills, N. J.
Browne, Dr. J. Alexander, Board of Health, Paterson, N. J.
Buckelew, F. L., Jamesburg, N. J.
Bulkley, Mrs. Edwin M., Walnut Street, Englewood, N. J.
Cadbury, Joel, 254 East Main Street, Moorestown, N. J.
Campbell, Mrs. E. S., 247 Belleville Avenue, Newark, N. J.
Chambers, Dr. Talbot R., 15 Exchange Place, Jersey City, N. J.
Corwin, Dr. Theodore W., 146 Second Avenue, Newark, N. J.

CRANKSHAW, DR. CHARLES W., Prudential Insurance Company, Newark, N. J.
CUSHING, MRS. G. W. B., 50 Munn Avenue, East Orange, N. J.
DELL, W. A., Morristown, N. J.
DENNIS, DR. L., 49 Ridge Street, Orange, N. J.
DICKINSON, DR. G. K., 280 Montgomery Street, Jersey City, N. J.
DINKLAGE, A., 68 Greenwood Avenue, Orange, N. J.
DOBBINS, EDWARD L., Newark, N. J.
DOUGLAS, DR. W. J., Superintendent, Tuberculosis Department, Essex County Isolation Hospital, Belleville, N. J.
DUBOIS, DR. FRANCIS E., 609 Watchung Avenue, Plainfield, N. J.
DUNHAM, DR. HENRY B., Glen Gardner, N. J.
EARLE, MRS. E. P., Edgewood Road, Montclair, N. J.
EASTON, ERNEST D., Executive Secretary, Newark Anti-Tuberculosis Association, 45 Clinton Street, Newark, N. J.
ENGLISH, DR. SAMUEL B., Sanatorium for Tuberculous Diseases, Glen Gardner, N. J.
GRABFELDER, S., 415 Bartlett Building, Atlantic City, N. J.
HANCE, DR. IRWIN H., Lakewood, N. J.
HAYDEN, FRANK, 126 Chestnut Street, Rutherford, N. J.
HEDGES, DR. B. VAN D., Plainfield, N. J.
HENRIQUES, DR. H. A., Morristown, N. J.
HOFFMAN, FREDERICK L., Prudential Insurance Company, Newark, N. J.
HOLT, MISS CONSTANCE, Lakehurst, N. J.
HUBBARD, DR. F. ELMORE, 45 Church Street, Montclair, N. J.
HUGHES, DR. FREDERICK J., 49 Somerset Street, Plainfield, N. J.
HUNT, DR. RALPH H., East Orange, N. J.
JARVIE, JAMES N., 150 Upper Mountain Avenue, Montclair, N. J.
JOHNSON, J. WILLIAM, 750 Broad Street, Newark, N. J.
KEATOR, DR. BRUCE S., Asbury Park, N. J.
KNOWLTON, DR. MILLARD, 78 North Clinton Avenue, Trenton, N. J.
KRANS, DR. EDWARD S., 920 Park Avenue, Plainfield, N. J.
LA MONTE, C. B., 510 Church Street, Bound Brook, N. J.
LANGDON, WOODBURY G., 151 Madison Avenue, Morristown, N. J.
LATANE, DR. H. A., Glen Gardner, N. J.
LUFBERRY, GEORGE F., JR., P. O. Box 214, Elizabeth, N. J.
MABIE, MRS. HAMILTON W., Summit, N. J.
MARETT, DR. W. C., Glen Gardner, N. J.
MARVEL, DR. PHILIP, 1616 Pacific Avenue, Atlantic City, N. J.
MEIGH, DR. J., Bernardsville, N. J.
MELLON, MRS. CHARLES H., Madison Avenue, Morristown, N. J.
MERCK, GEORGE, Llewellyn Park, West Orange, N. J.
MILLS, DAVID B., 154 Upper Mountain Avenue, Montclair, N. J.
MOORE, DR. GEORGE R., 259 Hamilton Avenue, Trenton, N. J.
NEWCOMB, DR. MARCUS W., Brown's-Mills-in-the-Pines, N. J.
OBERT, B. H., Secretary, Board of Health, Asbury Park, N. J.
POLLAK, DR. B. S., Medical Director, Hudson County Tuberculosis Hospital and Sanatorium, Secaucus, N. J.
RUNNELLS, DR. JOHN E., Scotch Plains, N. J.
RYAN, DR. JOHN N., 158 Lexington Avenue, Passaic, N. J.
SCHAUFFLER, DR. WILLIAM G., 400 Madison Avenue, Lakewood, N. J.
SEXSMITH, DR. G. H., 719 Avenue C., Bayonne, N. J.
SMITH, DR. THEOBOLD, Princeton, N. J.
SPAHR, MRS. CHARLES B., Princeton, N. J.
STEVENS, RICHARD, Hoboken, N. J.
STRÖMBERG, MRS. GUSTAF, Box 258, New Brunswick, N. J.
SUYDAM, MISS EMILY H., Executive Secretary, Association for the Prevention and Relief of Tuberculosis, Room 26, Court House, Elizabeth, N. J.
TITSWORTH, CHARLES GRANT, Fidelity Trust Company, Newark, N. J.
TYLER, WILLIAMS, 520 West 8th Street, Plainfield, N. J.
WENTWORTH, MRS. FRANCES N., 316 First Street, Lakewood, N. J.
WIERS, REV. E. S., Pastor, Unity Church, 161 Lloyd Road, Montclair, N. J.
WING, ASA S., Wingwood, Moorestown, N. J.
WITTPENN, MRS. CAROLINE B., Castle Point, Hoboken, N. J.

NEW MEXICO

BROWN, DR. WILLIAM T., Watrous, N. M.
BRUNS, CAPT. EARL H., Medical Corps, U. S. A., Fort Bayard, N. M.
BULLOCK, DR. E. S., The New Mexico Cottage Sanatorium, Silver City, N. M.
BUSHNELL, COL. G. E., U. S. Army General Hospital, Fort Bayard, N. M.
CIPES, DR. JOSEPH S., Albuquerque, N. M.
DUNCAN, DR. E. A., Silver City, N. M.
HYDE, DR. OLIVER T., St. Joseph Sanatorium, Albuquerque, N. M.
LAWS, DR. JAMES W., Lincoln, N. M.
MERA, DR. F. E., Santa Fé, N. M.
PETERS, DR. LEROY, Albuquerque Sanatorium, Albuquerque, N. M.
SHORTLE, DR. A. G., Albuquerque Sanitorium, Albuquerque, N. M.
SMITH, DR. FREDERICK C., Fort Stanton, N. M.
TEFFT, CAPT. W. H., U. S. Army General Hospital, Fort Bayard, N. M.
TWITCHELL, DR. DAVID C., Albuquerque, N. M.

NEW YORK

New York City (For remainder of State see below.)
ABBOTT, REV. LYMAN, The Outlook, 381 Fourth Avenue, New York City.
ADLER, DR. I., 22 East 62nd Street, New York City.
AGNEW, MRS. G. B., 121 East 69th Street, New York City.
ALDRICH, MRS. SHERWOOD, 52 East 67th Street, New York City.
ALEXION, DR. ALEXANDER, 153 East 27th Street, New York City
AMERICAN, MISS SADIE, Executive Secretary, Council of Jewish Women, 448 Central Park W., New York City
ANDERTON, DR. WALTER P., 825 Madison Avenue, New York City
ANDREWS, MRS. W. H., 130 East 67th Street, New York City
ARNSTEIN, LEO, 49 East 82nd Street, New York City
ARNSTEIN, MRS. LEO, 49 East 82nd Street, New York City
ASIEL, ELIAS, 52 Broadway, New York City
ASPINWALL, J. LAWRENCE, 320 Fifth Avenue, New York City
AUCHINCLOSS, JOHN W., 27 West 53rd Street, New York City
AUCHINCLOSS, MRS. C. C., 12 East 71st Street, New York City
BABBOTT, FRANK L., 346 Broadway, New York City
BACON, DR. GORHAM, 47 West 54th Street, New York City
BAILEY, DR. PEARCE, 52 West 53rd Street, New York City
BARBEY, HENRY G., 15 West 38th Street, New York City
BARRIE, DR. GEORGE, 601 West 110th Street, New York City
BARROWS, DR. CHARLES CLIFFORD, 63 East 56th Street, New York City
BARUCH, DR. SIMON, 51 West 70th Street, New York City
BÄTJER, HENRY, 11 East 81st Street, New York City
BEER, DR. EDWIN, 48 West 74th Street, New York City
BEER, MRS. JULIUS, 38 West 77th Street, New York City
BEHR, HERMAN, 75 Beekman Street, New York City
BELLER, MRS. A., 9 West 75th Street, New York City
BEND, MISS BEATRICE, 563 Park Avenue, New York City
BENDHEIM, BERTHOLD, 134 Grand Street, New York City
BENDHEIM, HENRY, 134 Grand Street, New York City
BENSON, MISS MARY, 214 Columbia Heights, Brooklyn, N. Y.
BIER, MRS. SYLVAN, 161 West 86th Street, New York City
BIGGS, DR. HERMANN M., 113 West 57th Street, New York City
BIGGS, MRS. HERMANN M., 113 West 57th Street, New York City
BILLINGS, MISS ELIZABETH, 279 Madison Avenue, New York City
BLISS, CORNELIUS N., JR., 117 Duane Street, New York City
BLISS, MISS L. P., 29 East 37th Street, New York City
BLISS, MRS. WILLIAM H., 6 East 65th Street, New York City
BLUM, DR. CHARLOTTE, 1018 East 163d Street, New York City
BLUMENTHAL, GEORGE, 23 West 53d Street, New York City
BLUMENTHAL, HUGO, 10 West 76th Street, New York City
BOGUE, DR. E. A., 63 West 48th Street, New York City
BOLLING, R. C., 71 Broadway, New York City
BOND, MISS KATE, 230 West 59th Street, New York City
BOORAEM, J. V. V., 204 Lincoln Place, Brooklyn, N. Y.

BORG, MISS EDITH D., 43 Fifth Avenue, New York City
BOVAIRD, DR. DAVID, JR., 156 Fifth Avenue, New York City
BRANDT, HARRY J., 15 Dey Street, New York City
BRANDT, MISS LILLIAN, 105 East 22d Street, New York City
BRANNAN, DR. JOHN W., 48 West 51st Street, New York City
BRECHER, E. A., 119 Lafayette Street, New York City
BREITENFELD, DR. S., 221 East 68th Street, New York City
BRENNER, DR. EDWARD C., 840 West End Avenue, New York City
BREWSTER, GEORGE S., 51 Wall Street, New York City
BRILL, DR. N. E., 48 West 76th Street, New York City
BRISTOL, JOHN I. D., 1 Madison Avenue, New York City
BRONSON, DR. E. B., 10 West 49th Street, New York City
BROWN, ALFRED L., 128 Broadway, New York City
BROWN, DR, ANNA L., 600 Lexington Avenue, New York City
BROWN, EDWIN H., 141 Broadway, New York City
BULKLEY, JONATHAN, 75 Duane Street, New York City
BURDICK, PROFESSOR FRANCIS M., 601 West 113th Street, New York City
BUTLER, DR. GLENTWORTH R., 226 Gates Avenue, Brooklyn, N. Y.
BYINGTON, DR. RODERICK, 1851 84th Street, Brooklyn, N. Y.
CABOT, MRS. F. H., 37 East 75th Street, New York City
CAESAR, HENRY A., 19 West 76th Street, New York City
CAMAC, DR. C. N. B., 108 West 65th Street, New York City
CANFIELD, GEORGE F., 49 Wall Street, New York City
CARLEBACH, EMIL, 136 West 86th Street, New York City
CARLEBACH, WALTER M., 136 West 86th Street, New York City
CARMAN, DR. A. R., 27 West 127th Street, New York City
CARNEGIE, ANDREW, 2 East 91st Street, New York City
CARTER, ERNEST T., 150 West 58th Street, New York City
CARTER, DR. H. S., 66 West 55th Street, New York City
CASTELLI, DR. ENRICO, 24 West 59th Street, New York City
CATURANI, DR. M., 348 East 116th Street, New York City
CAULDWELL, DR. CHARLES M., 58 W. 47th Street, New York City
CHAPIN, S. B., 930 Fifth Avenue, New York City
CHAPMAN, MRS. JOHN JAY, 325 West 82nd Street, New York City
CHILDS, WILLIAM H., 17 Battery Place, New York City
CLARK, FREDERICK AMBROSE, 1 West 72d Street, New York City
CLARK, WILLIAM A., 20 Exchange Place, New York City
CLYDE, WILLIAM P., 24 State Street, New York City
COFFIN, C. A., 30 Church Street, New York City
COHEN, OTTO, Whitehall Building, 17 Battery Place, New York City
COHN, DR. SALO, 139 West 126th Street, New York City
COLEMAN, DR. WARREN, 58 West 55th Street, New York City
COLLINS, DR. CHARLES FARNHAM, 50 West 55th Street, New York City
CONKLIN, ROLAND R., 1 Wall Street, New York City
CONLEY, DR. WALTER H., Metropolitan Hospital, Blackwell's Island, New York City
CONNER, DR. LEWIS A., 121 East 62d Street, New York City
COTTER, DR. JOHN J., 65 West 70th Street, New York City
CRARY, DR. GEORGE W., 535 Park Avenue, New York City
CROCKER, W. T., 143 East 35th Street, New York City
CURTIS, DR. H. HOLBROOK, 118 Madison Avenue, New York City
CURTIS, W. E., 27 West 47th Street, New York City
CUTTING, R. BAYARD, 32 Nassau Street, New York City
DARLINGTON, DR. THOMAS, 27 Washington Square, N., New York City
DAVIS, DAVID T., 55 Liberty Street, New York City
DEFORREST, HENRY W., 30 Broad Street, New York City
DEFORREST, JOHNSTON, 30 Broad Street, New York City
DEFORREST, ROBERT W., 30 Broad Street, New York City
DELANO, WARREN, JR., 30 East 36th Street, New York City 1
DENCH, DR. EDWARD B., 15 East 53d Street, New York City
DENNIS, DR. FREDERIC S., 62 East 55th Street, New York City
DENNO, DR. WILLARD J., 14 Central Park West, New York City
DEVINE, EDWARD T., Room 607, Kent Hall, 116th Street and Amsterdam Avenue, New York City
DICKINSON, MRS. R. L., 168 Clinton Street, Brooklyn, N. Y.
DODGE, CLEVELAND H., 99 John Street, New York City

Dodge, Miss Elizabeth W., 90 Park Avenue, New York City
Dodge, Mrs. R. L., 168 Clinton Street, Brooklyn, N. Y.
Doty, Dr. A. H., 205 West 57th Street, New York City
Douglas, James, 99 John Street, New York City
Dow, Mrs. Frederic G., 13 Central Park W., New York City
Draper, Dr. William Kinnicutt, 121 East 36th Street, New York City
Duncan, Mrs. John P., The Plaza, New York City
Dunham, Dr. Edward K., 35 East 68th Street, New York City
Emerson, Dr. Haven, 120 East 62d Street, New York City
Emerson, Mrs. William, 6 East 70th Street, New York City
Erdmann, William, 15 West 68th Street, New York City
Erlanger, Milton S., 65 Worth Street, New York City
Evans, Dr. S. M., 115 East 39th Street, New York City
Ewing, Dr. James, 477 First Avenue, New York City
Fischer, William H., 190 Franklin Street, New York City
Fishberg, Maurice, 1337 Madison Avenue, New York City
Fisher, Dr. Edward S., 46 East 52nd Street, New York City
Fisk, Dr. Eugene L., The Life Extension Institute, Inc., 25 West 45th Street, New York City
Fisk, Harvey E., 62 Cedar Street, New York City
Flexner, Dr. Simon, Rockefeller Institute, 66th Street and Avenue A, New York City
Folks, Homer, State Charities Aid Association, 105 East 22nd Street, New York City
Forbes, Miss Mary, Russell Sage Foundation, 130 East 22nd Street, New York City
Foster, Macomb G., P. O. Box 1120, New York City
Fox, Hugh F., U. S. Brewers' Association, 109 East 15th Street, New York City
Frank, Samuel, 574 West End Avenue, New York
Frankel, Lee K., Metropolitan Building, New York City
Frankenthal, J., 2 West 86th Street, New York City
Freeman, Dr. Rowland G., 211 West 57th Street, New York City
Freund, Emil, 159 East 61st Street, New York City
Frick, Henry C., 1 East 70th Street, New York City
Fried, Dr. Gustav A., 64 West 85th Street, New York City
Frissell, A. S., 530 Fifth Avenue, New York City
Frissell, Dr. Lewis F., 113 East 56th Street, New York City
Gaston, George H., 1 Madison Avenue, New York City
Gaston, Mrs. Martha E., Marie Antoinette Hotel Company, 66th Street and Broadway, New York City
Gawtry, Lewis B., 70 East 55th Street, New York City
Geer, Mrs. Walter, 246 West 72d Street, New York City
Gibney, Dr. V. P., 16 Park Avenue, New York City
Gibson, Dr. Charles L., 72 East 54th Street, New York City
Glenn, John M., 136 East 19th Street, New York City
Godkin, Lawrence, 36 West 10th Street, New York City
Goetchius, Dr. H. D., 447 Fort Washington Avenue, New York City
Goodrich, Miss Annie W., Department of Nursing and Health, Teachers College, New York City
Goodridge, Dr. Frederic G., 122 East 78th Street, New York City
Goodridge, Dr. Malcolm, 260 West 76th Street, New York City
Gottheil, Paul, 148 West 75th Street, New York City
Greenhut, B. J., Sixth Avenue and 19th Street, New York City
Guggenheim, Daniel, 165 Broadway, New York City
Guggenheim, William, 500 Fifth Avenue, NewYork City
Guiteras, Dr. Ramon, 80Madison Avenue, New York City
Haines, Dr. Charles C., 1136 Jackson Avenue, Bronx, New York City
Halpern, Dr. J., 51 East 91st Street, New York City
Hardon, Henry W., 60 Wall Street, New York City
Harkness, C. W., 26 Broadway, New York City
Harkness, Edward S., 26 Broadway, New York City
Harrison, Miss Marie L., 109 East 71st Street, New York City
Hartwell, Dr. John A., 27 East 63d Street, New York City
Hastings, Dr. Thomas Wood, 172 East 71st Street, New York City
Haupt, Dr. Louis, 232 East 19th Street, New York City
Hauswirth, Dr. Louis, 236 West 113th Street, New York City
Havemeyer, F. C., 129 Front Street, New York City
Hegeman, John R., President, Metropolitan Life Insurance Company, New York City

HEIDE, HENRY JR., 313 Hudson Street, New York City
HENTZ, HENRY, 769 St. Mark's Avenue, Brooklyn, N. Y.
HERBIG, DR. FRANK J., Sea View Hospital, West New Brighton, New York City
HERMANN, FERDINAND, 20 East 80th Street, New York City
HESS, DR. ALFRED F., 16 West 86th Street, New York City
HIGGINS, CHARLES M., 271 Ninth Street, Brooklyn, N. Y.
HINE, FRANCIS L., 2 Wall Street, New York City
HIRSCHHORN, FRED, 1020 Second Avenue, New York City
HOCHHAUSER, EDWARD, 356 Second Avenue, New York City
HOLT, DR. L. EMMETT, 14 West 55th Street, New York City
HORN, DR. FRANK I., 324 East 67th Street, New York City
HOYT, THEODORE R., 17 Battery Place, New York City
HUBER, DR. FRANCIS, 209 East 17th Street, New York City
HUDDLESTON, DR. JOHN H., 145 West 78th Street, New York City
HUDNUT, ALEXANDER M., 5 Nassau Street, New York City
HURD, R. M., 59 Liberty Street, New York City
HUTCHINSON, DR. WOODS, Hotel Marseille, 103d Street and Broadway, New York City
HUTTON, PROFESSOR FREDERICK REMSON, 257 West 86th Street, New York City
HUYLER, FRANK DEK., 64 Irving Place, New York City
ITTLESON, HENRY, 820 Adams Express Building, 61 Broadway, New York City
JACKSON, DR. GEORGE T., 11 East 48th Street, New York City
JACKSON, DR. V. H., 240 Lenox Avenue, New York City
JACOBI, DR. A., 19 East 47th Street, New York City
JACOBS, I. RANDOLPH, 160 Broadway, New York City
JAMES, DR. WALTER B., 17 West 54th Street, New York City
JEFFREY, A. M. L., 216 East 39th Street, New York City
JENKINS, JAMES, JR., Secretary, Committee on the Prevention of Tuberculosis, Brooklyn, Bureau of Charities, 60 Schermerhorn Street, Brooklyn, N. Y.
JENNINGS, MISS ANNIE B., 48 Park Avenue, New York City
KAHN, DR. ULYSSES S., 123 West 75th Street, New York City
KANE, MRS. JOHN INNES, 1 West 49th Street, New York City
KATZENBACH, W. H., The Wyoming, 853 Seventh Avenue, New York City
KELLY, DR. THOMAS. 357 West 57th Street, New York City
KENNADAY, PAUL, 780 Park Avenue, New York City
KEPPLER, RUDOLPH, 25 Broad Street, New York City
KESSEL, DR LEO, 88 Central Park West, New York City
KINGSBURY, JOHN A., Municipal Building, New York City
KISSEL, MRS. CAROLINE T., 12 East 55th Street, New York City
* KLEIN, DR. WILLIAM T., 108 West 120th Street, New York City
KLEIN, MRS. WILLIAM T., 108 West 120th Street, New York City
KLOTZ, DR. HERMANN G., 616 Madison Avenue, New York City
KNAUTH, WILHELM, 15 William Street, New York City
KNICKERBACKER, MRS. H., 135 Central Park, W., New York City
KNIGHT, DR. AUGUSTUS S., 1 Madison Avenue, New York City
KNOPF, DR. S. A., 16 West 95th Street, New York City
KONIGER, EDWARD H., The Equitable Life Assurance Society, 165 Broadway, New York City
KREMER, DR. G., 233 West 83d Street, New York City
KUHN, AUGUST, 141 Broadway, New York City
KUTZ, MISS SALLY E., 308 West 94th Street, New York City
LAGAI, G., 404 West 27th Street, New York City
LAIDLOW, DR. GEORGE F., 58 West 53d Street, New York City
LAMBERT, DR. ALEXANDER, 43 East 72d Street, New York City
LAMBERT, FRANK, 58 Coney Island Avenue, Brooklyn, N. Y.
LAMBERT, DR. SAMUEL W., 130 East 35th Street, New York City
LANGMAN, DR. GUSTAV, 121 West 57th Street New York City
LAWRENCE, JOHN BURLING, 126 East 30th Street, New York City
LEE, PROFESSOR FREDERIC S., 437 West 59th Street, New York City
LESSER, DR. A. MONAE, 166 West 72d Street, New York City
LEVI, ALBERT A., 108 Exchange Court, New York City
LEVI, MRS. ALBERT A., 108 Exchange Court, New York City
LEVI, EMIL S., 514 Broadway, New York City
LEWIS, DR. ROBERT, JR., 48 West 40th Street, New York City

* Deceased.

Lewisohn, Adolph, 61 Broadway, New York City
Lewisohn, Samuel A., 61 Broadway, New York City
Libman, Dr. Emanuel, 180 East 64th Street, New York City
Lilienthal, Dr. Howard, 48 East 74th Street, New York City
Loeb, James, 52 William Street, New York City
Longcope, Dr. Warfield T., 680 Madison Avenue, New York City
Low, Hon. Seth, 30 East 64th Street, New York City
Lupton, Mrs. Frank M., 839 St. Marks Avenue, Brooklyn, N. Y.
Lusk, Dr. Graham, Cornell Medical College, New York City
Lusk, Dr. William C., 47 East 34th Street, New York City
Lyman, Frank, 82 Wall Street, New York City
McAlpin, Dr. D. H., 3 East 54th Street, New York City
McCabe, E. M., 388 Washington Avenue, Brooklyn, N. Y.
McCrea, Professor Nelson G., 430 West 119th Street, New York City
McGoldrick, Dr. Thomas A., 294 Clinton Avenue, Brooklyn, N. Y.
McLane, Dr. James W., 107 East 38th Street, New York City
McLane, Mrs. James W., 107 East 38th Street, New York City
MacNeal, Dr. W. J., Post-Graduate Medical School, 20th Street and Second Avenue, New York City
McSweeny, Dr. E. S., Sea View Hospital, West New Brighton, New York City
Macy, V. Everit, 68 Broad Street, New York City
Manges, Dr. M., 72 East 79th Street, New York City
Mann, Frank H., Secretary, Committee on the Prevention of Tuberculosis, Charity Organization Society, 105 East 22d Street, New York City
Mannheimer, Dr. George, 41 West 51st Street, New York City
Mansfield, Howard, 49 Wall Street, New York City
Marks, Marcus M., 4 East 94th Street, New York City
Marshall, Louis, 47 East 72d Street, New York City
May, Dr. Edward J., 164 Montawk Avenue, Brooklyn, N. Y.
May, Dr. William Ropes, 121 East 38th Street, New York City
Meltzer, Dr. S. J. Rockefeller Institute, 66th Street and Avenue A, New York City
Mendelson, Dr. Walter, 159 West 74th Street, New York City
Merle-Smith Mrs. W., 29 West 54th Street, New York City
Mersereau, Dr. W. J., 294 West 92d Street, New York City
Meyer, Dr. Alfred, 785 Madison Avenue, New York City
Meyer, George D., V. S., 528 Washington Street, New York City
Meyer Dr. Willy, 700 Madison Avenue, New York City
Miller, Dr. George N., 811 Madison Avenue, New York City
Miller, Dr. James Alexander, 379 Park Avenue, New York City
Mills, William Wirt, 249 Manor Road, West New Brighton, Staten Island, New York City
Mitchell, John, 1 Madison Avenue, New York City
Mitchell, Wesley C., 37 West 10th Street, New York City
Mitchell, Mrs. Wesley C., 37 West 10th Street, New York City
Moak, Dr. Charles Henry, 525 West End Avenue, New York City
Mock, Hugo, 220 Broadway, New York City
Moffat, R. Burnham, 12 East 66th Street, New York City
Moffett, Dr. Rudolph Duryea, 830 Park Avenue, New York City
Moir, Henry, 256 Broadway, New York City
Moree, E. A., Committee on the Prevention of Tuberculosis, State Charities Aid Association, 105 East 22d Street, New York City
Morgan, William Fellowes, Arch 11, Brooklyn Bridge, New York City
Morgenstern, A. V., 49 Maiden Lane, New York City
Munger, H. C., 11 Cliff Street, New York City
Munn, Dr. John P., 18 West 58th Street, New York City
Nelbach, George J., Executive Secretary, Committee on the Prevention of Tuberculosis, State Charities Aid Association, 105 East 22d Street, New York City
Newcomb, Mrs. James E., 164 West 74th Street, New York City.
Nordlinger, Sidney, 160 Broadway, New York City
Norrie, Dr. Van Horn, 21 West 37th Street, New York City
Norris, Dr. Charles, 2131 Broadway, New York City
Northrup, Dr. W. P., 57 East 79th Street, New York City
O'Brien, Morgan J., 2 Rector Street, New York City;
Oettinger, P. J., Ph. D., 418 Central Park West, New York City
Oppenheimer, Dr. Henry S., 276 Madison Avenue, New York City
O'Reilly, Dr. James A., Coney Island Hospital, Brooklyn, N. Y.

OSBORN, WILLIAM CHURCH, 71 Broadway, New York City
OSBORN, MRS. WILLIAM CHURCH, 40 East 36th Street, New York City
PARK, DR. WILLIAM H., 315 West 76th Street, New York City
PARKER, MRS. GURDON S., 898 Madison Avenue, New York City
PATTERSON, DR. HENRY STUART, 130 East 62d Street New York City
PAULDING, J. K., 133 West 11th Street, New York City
PEASE, DR. HERBERT D., 39 West 38th Street, New York City
PECK, DR. CHARLES H., 30 West 50th Street, New York City
PECK, MISS SARAH W., 90 Prospect Park West, Brooklyn, N. Y.
PEET, DR. EDWARD WRIGHT, 144 West 93d Street, New York City
PELTON, DR. HENRY HUBBARD, 345 West 85th Street, New York City
PHELAN, DR. DANIEL J., 123 West 94th Street, New York City
PHIPPS, HENRY, 1063 Fifth Avenue, New York City
PHIPPS, JOHN S., 787 Fifth Avenue, New York City
PORTER, MRS. A. KINGSLEY, 450 West End Avenue, New York City
POST, ABRAM S., 81 Fulton Street, New York City
POTTER, MISS BLANCHE, 180 West 59th Street, New York City
POTTER, DR. NATHANIEL BOWDITCH, 591 Park Avenue, New York City
PRICE, DR. GEORGE N., 31 Union Square, New York City
PRICE, THEODORE H., 15 Wall Street, New York City
PRUDDEN, DR. T. MITCHELL, 160 West 59th Street, New York City
PULLEY, DR. W. J., 945 Madison Avenue, New York City
PYNE, M. TAYLOR, 263 Madison Avenue, New York City
QUINCY, MISS ADA IVES, 158 West 58th Street, New York City
RANDOLPH, EDMUND D., 346 Broadway, New York City
RANDOLPH, MISS MAY F., 451 Macon Street, Brooklyn, N. Y.
RAUBITSCHECK, RUDOLPH, 100 Fifth Avenue, New York City
RAVEN, A. A., 864 President Street, Brooklyn, N. Y.
REESE, MRS. W. WILLIS, 103 East 37th Street, Nwe York City
REYNOLDS, GEORGE G., 2 Rector Street, New York City
RIDDER, HERMAN, 182 William Street, New York City
ROCKEFELLER, JOHN D., 26 Broadway, New York City
ROGERS, DR. OSCAR H., N. Y. Life Insurance Company, 346 Broadway, New York City
ROSENBAUM, S. G., 207 West 24th Street, New York City
ROUTZAHN, E. G., 130 East 22d Street, New York City
RUBINSTEIN, DR. J. L., 1667 Washington Avenue, New York City
SACHS, DR. B., 116 West 59th Street, New York City
SAKS, W. A., Broadway and 34th Street, New York City
SALOMON, DR. HARRY, 258 Riverside Drive, New York City
SANDERSON, MRS. EDWARD F., 125 Remsen Street, Brooklyn, N. Y.
SARTORIUS, OTTO, 184 Washington Park, Brooklyn, N. Y.
SAYRE, DR. REGINALD H., 14 West 48th Street, New York City
SCHAIE, DR MILTON, 329 Cathedral Parkway, New York City
SCHIEFFELIN, WILLIAM JAY, 5 East 66th Street, New York City
SCHIEREN, CHARLES A., Schieren Building, 30 Ferry Street, New York City
SCHIFF, JACOB H., 52 William Street, New York City
SCHILT, MRS. L., 331 West 101st Street, New York City
SCHNEIDER, FRANZ, JR., 130 East 22d Street, New York City
SCHOONMAKER, S. L., 30 Church Street, New York City
SCHWARZENBACH, ROBERT J. F., 470 Fourth Avenue, New York City
SCOPES, WILLIAM H., 39 East 28th Street, New York City
SEAGER, PROFESSOR HENRY R., Columbia University, New York City
SEAMAN, MAJOR LOUIS L., 247 Fifth Avenue, New York City
SELIGMAN, ISAAC N., 1 William Street, New York City
SELIGMAN, JEFFERSON, 1 William Street, New York City
SEYMOUR, DR. N. GILBERT, 129 East 17th Street, New York City
SHAFFER, DR. NEWTON M., 31 East 49th Street, New York City
SHIVELY, DR. HENRY L., 303 Amsterdam Avenue, New York City
SLADE, DR. CHARLES B., 245 West 74th Street, New York City
SMITH, DR. A. ALEXANDER, 18 West 51st Street, New York City
SNOW, DR. WILLIAM F., 105 West 40th Street, New York City
SOLLEY, DR. FRED P., 114 East 60th Street, New York City
SOLLEY, DR. JOHN B., JR., 968 Lexington Avenue, New York City
STANDT, JOHN, 68 East 80th Street, New York City
STARR, DR. I. P., 21 Montgomery Street, New York City

STEIN, FRED M,, 15 West 75th Street, New York City
STELLA, DR. ANTONIO, 214 East 16th Street, New York City
STERN, BENJAMIN, 542 Fifth Avenue, New York City
STEVENS, DR. A. R., 40 East 41st Street, New York City
STEWART, WILLIAM R., 31 Nassau Street, New York City
STILLMAN, DR. RALPH G., 128 West 59th Street, New York City
STIMSON, MISS CANDACE C., 277 Lexington Avenue, New York City
STIMSON, DR. DANIEL M. 28 West 37th Street, New York City
STOREY, DR. THOMAS A., College of the City of New York, 138th Street and Convent Avenue, New York City
STRAUS, NATHAN, 27 West 72d Street, New York City
STRAUSS, ALBERT, 1 William Street, New York City
STRAUSS, FREDERICK, 1 William Street, New York City
STRONG, DR. ARCHIBALD McI., 251 West 89th Street, New York City
STURGIS, F. K,, 17 East 51st Street, New York City
SWEENEY, JOHN F., 128 West 23d Street, New York City
SYMS, DR. PARKER, 361 Park Avenue, New York City
SYMONDS DR. BRANDRETH, Medical Department, The Mutual Life Insurance Company of New York, 32 Nassau Street, New York City
TALMADGE, HENRY P., 50 Pine Street, New York City
TASCHMAN, DR. MAX, 68 West 114th Street, New York City
THACHER, DR. JOHN S., 20 West 50th Street, New York City
THACHER, THOMAS, 62 Cedar Street, New York City
TIEMANN, MISS EDITH W., 128 West 11th Street, New York City
TIFFANY, LOUIS C., 401 Fifth Avenue, New York City
TOD, WILLIAM STEWART, 30 East 42d Street, New York City
TOUGH, MISS MARY, 705 St. Marks Avenue, Brooklyn, N. Y.
TOWNE, HENRY R., 121 Madison Avenue, New York City
TOWNSEND, DR. WISNER R., 125 West 58th Street, New York City
TRESCA, DR. E., 175 Worth Street, New York City
TUCKER, FRANK, 346 Fourth Avenue, New York City
TUCKERMAN, PAUL, 59 Wall Street, New York City
UHL, OSWALD W., 1 West 72d Street, New York City
UNTERBERG, I., 90 Franklin Street, New York City
UNTERMYER, ALVIN, 37 Wall Street, New York City
VAN BEUREN, DR. F. T., JR., 812 Park Avenue, New York City
VAN DEN BURG, DR. WILLIAM H., 30 West 48th Street, New York City
VAN INGEN, 125 East 71st Street, New York City
VAN PELT, JOHN V., 381 Fourth Avenue, New York City
VAN WAGENEN, BLEECKER, 443 Fourth Avenue, New York City
VEILLER, LAWRENCE, 105 East 22d Street, New York City
WAID, D. EVERITT, 1 Madison Avenue, New York City
WALKER, DR. JOHN B., 50 East 34th Street, New York City
WALLACE, DR. CHARLTON, 507 Madison Avenue, New York City
WALSH, DR. JOHN T., 135 West 94th Street, New York City
WALSH, SAMUEL A., 15 Wall Street, New York City
WARBURG, FELIX M., 52 William Street, New York City
WATERBURY, JOHN I., 15 Wall Street, New York City
WATERHOUSE, DR. M. M., 331 West 46th Street, New York City
WATERS, DR. BERTRAM H., 40 East 41st Street, New York City
WATERS, MISS YSABELLA G., Room 1503, 25 West 45th Street, New York City
WATSON, MRS. J. HENRY, 51 West 75th Street, New York City
WEBBER, CHARLES A., 44 Court Street, Brooklyn N. Y.
WEEKS, DR. JOHN E., 46 East 57th Street, New York City
WEEKS RUFUS W., 346 Broadway, New York City
WEISS, DR. JULIUS, 329 West 28th Street, New York City
WELKER, DR. FRANKLIN, 344 West 145th Street, New York City
WESTCOTT, MRS. ROBERT E., 787 Fifth Avenue, New York City
WESTMORELAND, DR. F. S., North Brother Island, New York City
WHEELER, MRS. EVERETT P., 150 East 72d Street New York City
WHIDDEN, DR. RAE W., 379 Park Avenue, New York City
WHITE, ALFRED T., 40 Remsen Street, Brooklyn, N. Y.
WHITE, EDWARD D., 265 Stuyvesant Avenue, Brooklyn, N. Y.
WHITE, HORACE, 18 West 69th Street, New York City
WHITE, THOMAS R., JR., 100 Broadway, New York City

WHITMAN, ALFRED A., 15 William Street, New York City
WIENER, DR. ALFRED, 616 Madison Avenue, New York City
WILLARD, DR. THOMAS H., Metropolitan Life Insurance Company, 1 Madison Avenue, New York City
WILLCOX, WILLIAM G., 3 South William Street, New York City
WILSON, DR. FREDERICK N., 40 East 41st Street, New York City
WILSON, DR. MARGARET B., Hunter College, 68th Street and Park Avenue, New York City
WIMPFHEIMER, CHARLES A., 450 Fourth Avenue, New York City
WING, FRANK L., 352 West 13th Street, New York City
WINTHROP, MISS MARY vS., Care of Miss Chalmers, 170 West 59th Street, New York City
WOLF, W. IRVING, 511 East 72d Street, New York City
WOLFE, S. H., 165 Broadway, New York City
WOLFF, LEWIS S., 12 East 70th Street, New York City
WOLFF, MRS. LEWIS S., 12 East 70th Street, New York City
WOODWARD, ROBERT B., 118 Pierrepont Street, Brooklyn, N. Y.
WOOLLEY, DR. JAMES V. S., 75 East 79th Street, New York City
WOOLLEY, DR. SCUDDER J., 157 West 76th Street, New York City
WORMSER, MRS. ISADOR, 836 Fifth Avenue, New York City
WUNDERLICH, DR. F. W., 184 Joralemon Street, Brooklyn N. Y.

ACKER, MISS DELIA FINCH, 160 Smith Street, Peekskill, N. Y.
ADAMS, SAMUEL HOPKINS, 32 Chedell Place, Auburn, N. Y.
ADLER, ISAAC, 1008 Granite Building, Rochester, N. Y.
ALBERTSON, DR. HARVEY S., 193 West 1st Street, Oswego, N. Y.
ALLEN, DR. J. R., Orwell, N. Y.
ALMY, FREDERIC, 181 Franklin Street, Buffalo, N. Y.
ANDREWS, MISS KATE RIDER, 19 Prince Street, Rochester, N. Y.
ARMSTRONG DR. S. T., Hillbourne Farms, Katonah, N. Y.
BAKER, DR. EUGENE, 108 West Senaca Street, Ithaca, N. Y.
BALDWIN DR. EDWARD R., Saranac Lake, N. Y.
BATZELL, PAUL E., Executive Secretary, Buffalo Association for the Relief and Control of Tuberculosis, 181 Franklin Street, Buffalo, N. Y.
BAUSCH EDWARD, 663 East Avenue, Rochester, N. Y.
BAUSCH, WILLIAM, 1063 St. Paul Street, Rochester, N. Y.
BENDHEIM, A. D., 35 Franklin Avenue, Far Rockaway, N. Y.
BIGGS, DR. CHAUNCEY P., Ithaca, N. Y.
BLANCHET, DR. SIDNEY F., 27 Church Street, Saranac Lake, N. Y.
BLANKEMEYER, DR. H. J., Gabriel's Sanatorium, Gabriel's, N. Y.
BLODGETT, DR. HARRY W., Box 322, Lake Placid, N. Y.
BOMBARD, G. A., Saranac Lake, N. Y.
BOWDITCH, EDWARD, Rathbone, Sard & Company, Albany, N. Y.
BRAY, DR. H. A., Ray Brook, N. Y.
BRAYTON, DR. HARRY J., 1528 South State Street, Syracuse, N. Y.
BREWER, DR. ISAAC W., Geneva, N. Y.
BREWER, MRS. ISAAC W., Geneva, N. Y.
BREWSTER, MRS. H. P., 24 North Goodman Street, Rochester, N. Y.
BRIDGE, DR. EZRA R., Loomis, N. Y.
BROWN, DR. LAWRASON, Saranac Lake, N. Y.
BURNETT, SAMUEL H., 410 University Avenue, Ithaca, N. Y.
BURRELL, D. H., JR., 584 Garden Street, Little Falls, N. Y.
BURRELL, LOOMIS, Little Falls, N. Y.
BYINGTON, MRS. W. W., The Knickerbocker, 175 Jay Street, Albany, N. Y.
CAMPBELL, DR. DONALD D., Otisville Sanatorium, Otisville, N. Y.
CHALMERS, ATHRUR A., Amsterdam, N. Y.
CHAPMAN, DR. J. FRANCIS, The Terrace, Katonah, N. Y.
CHILD, DR. FRANK S., JR., Port Jefferson, L. I.
CONE, DR. JULIUS, Saranac Lake, N. Y.
CONNOLLY, MISS ELIZABETH M., North River, N. Y.
COVERT, DR. J. BYINGTON, Geneva, N. Y.
CRANE, MRS. FREDERICK, 123 Alsop Street, Jamaica, N. Y.
CRAVEN, MOTHER M. PATRICIA, Gabriel's, N. Y.
DALE, MRS. JOSEPH S., 142 North Columbus Avenue, Mt. Vernon, N. Y.
DELANEY, DR. J. POPE, Geneva, N. Y.
DEWITT, MISS KATHERINE, 211 Westminster Road, Rochester, N. Y.
DICK, MRS. J. HENRY, Islip, Long Island, N. Y.

Dorn, Dr. Elliott I., Otisville Sanatorium, Otisville, N. Y.
Doust, Dr. H. Burton, 641 Park Avenue, Syracuse, N. Y.
Drescher, William A. E., East Avenue, Brighton Station, R. F. D. 1, Rochester, N. Y.
Dworetzky, Dr. Julius, Otisville Sanatorium, Otisville, N. Y.
Eichel, Dr. Otto R., 28 Chestnut Street, Albany, N. Y.
Elsner, Dr. Henry L., Fayette Park, Syracuse, N. Y.
Emans, Dr. J. Seymour, Rainbow Lake, Franklin County, N. Y.
Emmet, C. Temple, Stony Brook, N. Y.
Fairchild, F. L., P. O. Box 562, Saranac Lake, N. Y.
Ferguson, Miss Anna B., The Samuel W. Bowne Memorial Hospital, Poughkeepsie, N. Y.
Feustmann, Maurice M., 64 Main Street, Saranac Lake, N. Y.
Fitch, Dr. Ralph R., 365 East Avenue, Rochester, N. Y.
Fitchard, W. H., 1164 Albany Street, Utica, N. Y.
Fleming, Dr. Walter S., 141 Rich Avenue, Mt. Vernon, N. Y.
Ford, Mrs. Esther W., Box 572, Liberty, N. Y.
French, Roy L., Attica, N. Y.
Fronczak, Dr. Francis E., Health Commissioner, Buffalo, N. Y.
Gage, Professor Simon Henry, Cornell University, Ithaca, N. Y.
Gage-Day, Dr. Mary, 207 Wall Street, Kingston, N. Y.
Garvin, Dr. A. H., N. Y. State Hospital, Ray Brook, N. Y.
Gibson, Charles, 74 State Street, Albany, N. Y.
Ginsburg, Dr. Abraham, Otisville, N. Y.
Goler, Dr. G. W., Health Bureau, 173 Alexander Street, Rochester, N. Y.
Green, Mrs. W. Jerome, 1 Rutger Park, Utica, N. Y.
Hagedorn, Dr. Edwin F., 13 Elm Street, Gloversville, N. Y.
Halsted, Dr. T. H., 831 University Block, Syracuse, N. Y.
Hart, H. Gilbert, 364 Genesee Street, Utica, N. Y.
Hart, Dr. James A., Geneva, N. Y.
Havemeyer, J. C., Yonkers, N. Y.
Hazard, Mrs. F. R., Syracuse, N. Y.
Heffron, Dr. John L., 1228 South Salina Street, Syracuse, N. Y.
Heise, Dr. Fred H., Adirondack Cottage Sanitarium, Trudeau, N. Y.
Hewitt, Dr. Joseph H., 63 River Street, Saranac Lake, N. Y.
Hitch, Mrs. Frederick Delano, Newburgh, N. Y.
Houle, Dr. L. G., Adirondack Cottage Sanitarium, Trudeau, N. Y.
Howk, Dr. Horace John, Metropolitan Life Insurance Company Sanatorium, Wilton, N. Y.
Howser, Dr. Frank P., Otisville, N. Y.
Hunt, Dr. F. H., New York State Hospital for Incipient Tuberculosis, Ray Brook, N. Y.
Huyck, Mrs. Emily, 387 State Street, Albany, N. Y.
Hyde, Dr. Clarence L., J. N. Adam Memorial Hospital, Perrysburg, N. Y.
Keith, Dr. Horace G., 307 South Broadway, Yonkers, N. Y.
Kelly, Dr. William Henry, 233 Western Avenue, Albany, N. Y.
Kendall, Mrs. W. M., 138 Park Avenue, Saranac Lake, N. Y.
Kerin, William E., 145 Fourth Street, Troy N. Y.
Kibbe, Dr. Edwin J., Cranesville, N. Y.
Kimball, Dr. Grace N., 337 Mill Street, Poughkeepsie, N. Y.
King, Dr. Herbert Maxon, Loomis Sanatorium, Loomis, Sullivan County, N. Y.
Kinghorn, Dr. Hugh M., 14 Church Street, Saranac Lake, N. Y.
Kirstein, Louis E. Stein-Block Company, Rochester, N. Y.
Kolb, Dr. Edwin P., New York State Hospital, Ray Brook, N. Y.
Krause, Dr. Allen K., 6 Clinton Avenue, Saranac Lake, N. Y.
Krumwiede, Dr. Charles, Jr., 15 Hobart Street, Bronxville, N. Y.
Lansing, J. Townsend, 231 State Street, Albany, N. Y.
Lauderdale, Dr. Walter E., Geneseo, N. Y.
Lawson, Dr. William E., Jr., Metropolitan Life Insurance Company Sanatorium, Wilton, N. Y.
Leary, Dr. Montgomery E., 827 West Main Street, Rochester, N. Y.
Lent, Dr. M. F., Stony Wold Sanatorium, Lake Kushaqua, N. Y.
Lenz, Dr. George, 68 Bleecker Street, Gloversville, N. Y.
Linch, Charles, 123 North Allen Street, Albany, N. Y.
Lo Grasso, Dr. Horace, Perrysburg, N. Y.
Lomb, Carl F., 597 East Avenue, Rochester, N. Y.
Ludlow, Henry S., Troy, N. Y.
MacFarlane, Dr. Andrew, 274 State Street, Albany, N. Y.
Madill, Dr. Grant C., Ogdensburg, N. Y.

MARVIN, J. B., Jr., Saranac Lake, N. Y.
MAYHEW, DR. WALTER H., Trudeau, N. Y.
MEAD, MISS FRANCES S., Lake Waccabuc, N. Y.
MEADER, DR. F. M., State Department of Health, Albany, N. Y.
MERCER, DR. A. CLIFFORD, 324 Montgomery Street, Syracuse, N. Y.
MERRIAM, DR. H. E., Ithaca, N. Y.
MILLER DR. C. ROSS, Station A, Ogdensburg, N. Y.
MILLER, DR. JOHN G., 18 East Main Street, Lancaster, N. Y.
MILLER, DR. RAYMOND A., 147 Grand Street, Newburgh, N. Y.
MILLS, DR. CHARLES W., Loomis Sanatorium, Loomis, Sullivan County, N. Y.
MOFFAT, DR. HENRY, 139 Park Avenue, Yonkers, N. Y.
MOORE, DR. VERANUS A., Ithaca, N. Y.
MORGAN, MRS. JOHN B., Sterlington, Rockland County, N. Y.
MOSS, DR. WILLIAM L., 113 High Street, Buffalo, N. Y.
MUNRO, J. G., 61 Erie County Bank Building, Buffalo, N. Y.
NEEB, DR. ARTHUR B., Metropolitan Life Insurance Company Sanatorium, Wilton, N. Y.
NELSON, DR. STUART W., Old Forge, N. Y.
NEWBOLD, MISS C. A., Poughkeepsie, N. Y.
NICHOLS, DR. JOSEPH LONGWORTH, Saranac Lake, N. Y.
NORTH, MISS ELLEN H., Geneseo, N. Y.
NORTON, DR. C. W., Cazenovia, N. Y.
OLCOTT, DUDLEY, Albany, N. Y.
OLMSTED, MRS. ALICE A., LeRoy Anti-Tuberculosis League, 35 East Main Street, LeRoy, N. Y.
PACKARD, DR. EDWARD N., 18 Church Street, Saranac Lake, N. Y.
PARKINSON, DR. VERNON M., Metropolitan Life Insurance Company Sanatorium, Wilton, N. Y.
PATERSON, DR. ROBERT C., 50 Shepard Avenue, Saranac Lake, N. Y.
PATTERSON, DR. CHARLES ECTOR, 68 Academy Street, Liberty, N. Y.
PAULL, DR. CHESTER A., Liberty, N. Y.
PORTER, DR. EUGENE H., Upper Lisle, N. Y.
PREST, DR. CHARLES S., 54 Third Street, Waterford, N. Y.
PRICE, DR. J. WOODS, 116 Main Street, Saranac Lake, N. Y.
PRYOR, DR. JOHN H., 26 Linwood Avenue, Buffalo, N. Y.
PULLEN, DR. H. A., 131 Allen Street, Buffalo, N. Y.
QUINTON, DR. W. W., 232 Elmwood Avenue, Buffalo, N. Y.
RANSOM, DR. J. B., Dannemora, N. Y.
RATHBUN, DR. WALTER LATHAM Otisville Sanatorium, Otisviile, N. Y.
RAYEVSKY, DR. CHARLES, Liberty, N. Y.
REYNOLDS, DR. FRANK L. S., Lake View Sanatorium, Troy, N. Y.
RHAME, DR. WILLIAM, Wantagh, N. Y.
ROBERTO, DR. ROMEO, 4 Fowler Avenue, Yonkers, N. Y.
ROCHESTER, DR. DELANCEY, 469 Franklin Street, Buffalo, N. Y.
ROOSEVELT, HON. THEODORE, Oyster Bay, Long Island, N. Y.
ROSENBAUM, HERMAN S., Box 217 Broadway, Lawrence, Long Island, N. Y.
ROSENBERG, DR. LEOPOLD, 274 Van Guelder Terrace, New Rochelle, N. Y.
RUMSEY, MRS. CHARLES CARY, Glen Head, L. I.
RUSSELL, DR. N. G., 469 Franklin Street, Buffalo, N. Y.
RYTTENBURG, DR. CHARLES, 246 Westchester Avenue, Port Chester, N. Y.
SADLIER, DR. J. E., 295 Mill Street, Poughkeepsie, N. Y.
SAEGMULLER, GEORGE N., 1100 St. Paul Street, Rochester, N. Y.
SAGE, MRS. DEAN, Menands, Albany, N. Y,
SANDFORD, MRS. F. S., Dansville, N. Y.
SCHMID, DR. H. ERNEST, White Plains, N. Y.
SCUDDER, DR. N. C., 104 West Liberty Street, Rome, N, Y.
SEWARD, WILLIAM R., 218 Alexander Street, Rochester, N. Y.
SHALET DR. LOUIS, Bedford Hills, N. Y.
SHARMAN, MRS. WILLIAM, 23 Belmont Terrace, Yonkers, N. Y.
SHAW DR. HENRY L. K., 361 State Street, Albany, N. Y.
SHELLEY, DR. H. J., 66 East Main Street, Middletown, N. Y.
SHEPARD, MRS. FINLEY J., "Lyndhurst," Irvington-on-Hudson, N. Y.
SHILLADY, JOHN R., 322 South Second Avenue, Mt. Vernon, N. Y.
SINGER, DR. EMANUEL, Loomis, N. Y.
SMITH, MRS. HELEN, Sprain Ridge Hospital, Yonkers, N. Y.
SMITH, DR. JOHN A., 41 Riverside Drive, Saranac Lake, N. Y.
SOPER, DR. WILLARD B., 96 Park Avenue Saranac Lake, N. Y.

Stockton, Dr. Charles G., 436 Franklin Street, Buffalo, N. Y.
Stover, Dr. Charles, 31 Division Street, Amsterdam, N. Y.
Straight, Mrs. Willard, Westbury, L. I.
Strayer, Mrs. Paul M., 380 Oxford Street, Rochester, N. Y.
Taylor, Rev. William R., D.D., 13 Prince Street, Rochester, N. Y.
Trembley, Dr. Charles C., Saranac, N. Y.
Trudeau, Dr. Edward L., Saranac Lake, N. Y.
Trudeau, Dr. F. B., Saranac Lake, N. Y.
Vander Veer, Dr. A., 28 Eagle Street, Albany, N. Y.
Van Rensselaer, Dr. Howard, 123 State Street, Albany, N. Y.
Vogeler, Dr. William J., 403 Palisade Avenue, Yonkers, N. Y.
von Isakovics, Alois, Synfleur Scientific Laboratories, Monticello, N. Y.
von Tiling, Dr. Johannes H., 278 Mill Street, Poughkeepsie, N. Y.
Walker, Mrs. Ada C., 423 State Street, Albany N. Y.
Ward, Dr. Samuel B., 281 State Street, Albany, N. Y.
Watson, Miss Lucy Carlile, 270 Genesee Street, Utica, N. Y.
Weyl, Walter E., Woodstock, Ulster County, N. Y.
Wheeler, Miss Lilla C., Portville, N. Y.
Whipple, Dr. Edward G., 109 Ravine Avenue, Rochester, N. Y.
White, Benjamin, Ph.D., Research and Antitoxin Laboratories, Otisville, N. Y.
White, Dr. William H., Otisville Sanatorium, Otisville, N. Y.
Wilcox, Ansley, 684 Ellicott Square, Buffalo, N. Y.
Williams, Dr. H. St. John, Bowne Memorial Hospital, Poughkeepsie, N. Y.
Williams, Dr. Linsly R., New York State Department of Health, Albany, N. Y.
Williams, Mrs. N. Hance W., 50 Baker Street, Saranac Lake, N. Y.
Williams, Mrs. R. B., Jr., Ithaca, N. Y.
Wolcott, Miss Mary H., 12 Plant Street, Utica N. Y.
Woolley, Dr. James Stanley, Otisville Sanatorium, Otisville, N. Y.
Wright, Dr. Jonathan, Windy Rock, Pleasantville, N. Y.
Young, Dr. J. C., Secretary, Cuba Committee on the Study and Prevention of Tuberculosis, Cuba, N. Y.

NORTH CAROLINA

Achard, Dr. H. J., 46 Reed Street, Asheville, N. C.
Archer, Dr. I. J., Cragmont and Royal League, Black Mountain, N. C.
Battle, Dr. S. Westray, Asheville, N. C.
Cocke, Dr. Charles Hartwell, 101 Citizen Building, Asheville, N. C.
Dunn, Dr, W. L., Asheville, N. C.
Egerton, Dr. J. L., Hendersonville, N. C.
Frazer, Dr. Thompson, Citizen Building, Asheville, N. C.
Gladmon, Dr. Edwin, Southern Pines, N. C.
Greene, Dr. Joseph B., 29 Haywood Street, Asheville, N. C.
Harris, Mrs. A. L., Reidsville, N. C.
Jenkins, Mr. H. O., Winston-Salem, N. C.
Kirk, Dr. William Redin, Hendersonville, N. C.
Lapham, Dr. Mary E., Highlands, N. C.
Lewis, Dr. Richard H., Raleigh, N. C.
Ludlow, J. L., Chairman, Anti-Tuberculosis Committee, Winston-Salem, N. C.
McBrayer, Dr. L. B., Sanatorium, N. C.
McCain Dr. Paul P., North Carolina Sanatorium for the Treatment of Tuberculosis, Aberdeen, N. C.
Minor, Dr. Charles L., Asheville, N. C.
Morse, Dr. Lucius B., Hendersonville, N. C.
O'Berry, Mrs. Thomas, Committee for the Prevention of Tuberculosis, Goldsboro, N. C.
Orr, Dr. Charles C., Asheville, N. C.
Perkins, Mrs. F. M., Fairview Cottage, Asheville, N. C.
Rankin, Dr. W. S., State Board of Health, Raleigh, N. C.
Ringer, Dr. Paul H., Asheville, N. C.
Stevens, Dr. Martin L., Asheville, N. C.
von Ruck, Dr. Silvio, Winyan Sanatorium, Asheville, N. C.
Watt, Mrs. J. N., Chairman, Anti-Tuberculosis Committee, Reidsville, N. C.
Weil, Mrs. Henry, 200 West Chestnut Street, Goldsboro, N. C.

NORTH DAKOTA

BODENSTAB, DR. WILLIAM H., Bismarck, N. D.
BRISTOL, DR. LEVERET DALE, University, N. D.
GRASSICK, DR. J., Grand Forks, N. D.
QUAIN, MRS. E. P., Secretary, North Dakota Anti-Tuberculosis Association, Bismarck, N. D.
SCHLANSER, MISS MARY, Box 633, Fargo, N. D.
STICKNEY, DR. VICTOR H., Dickinson, N. D.
VAN ES, DR. L., Agricultural College, N. D.

OHIO

ACH, SAMUEL, Forest and Washington Avenues, Cincinnati, Ohio
ADAMS, A. E., Youngstown, Ohio
ARMS, MYRON I., 639 Wick Avenue, Youngstown, Ohio
ARMS, WILFORD P., Care of Realty Trust Company, Youngstown, Ohio
BABCOCK, MRS. W. A., 8914 Euclid Avenue, Cleveland, Ohio
BACHMEYER, DR. A. C., Cincinnati General Hospital, Cincinnati, O.
BANTING, C. C., 2455 Robinwood Street, Toledo, Ohio
BISHOP, DR. R. H. JR., Secretary, The Anti-Tuberculosis League of Cleveland, 501 St. Clair Avenue, Cleveland, Ohio
BOOTH, C. H., 606 Wick Avenue, Youngstown, Ohio
CAMERON, GEORGE D., Western Reserve Building, Cleveland, Ohio
CASE, DR. CLARENCE E., Corner Park and Center Streets, Ashtabula, Ohio
CASEMENT, MRS. J. S., Jennings Place, Painesville, Ohio
CLARK DR. COLIN R., 415 Bryson Street, Youngstown, Ohio
COLSTON, EDWARD, 111 East Fourth Street Cincinnati, Ohio
COSTOLO, DR. J. W., Sidney, Ohio
COULBY, H., Rockefeller Building, Cleveland, Ohio
COX, DR. S. S., Wagner Block, Lorain, Ohio
CUMMINS, MRS. S. O., Secretary, Belmont County Anti-Tuberculosis Society, Edgehill, Bellaire, Ohio
CUSHING, MRS. EDWARD F., 4712 Euclid Avenue, Cleveland, Ohio
DALTON, H. G., Western Reserve Building, Cleveland, Ohio
DANIELLS, DR. RALPH P., 228 Michigan Street, Toledo, Ohio
DICE, DR. W. G., 240 Michigan Street, Toledo, Ohio
DOUGLASS, DR. STEPHEN, Ohio State Sanatorium, Mt. Vernon, Ohio
DUNHAM, DR. H. KENNON, 2503 Auburn Avenue, Cincinnati, Ohio
EHLERT, MISS CAROLINE E., 108½ Harmon Street, Warren, Ohio
FORD, DR. C. E., 421 Superior Avenue, Cleveland, Ohio
FORD, MRS. JOHN S., 509 Wick Avenue, Youngstown, Ohio
GARLAND, D. FRANK, 508 West 4th Street, Dayton, Ohio
GARLICK, H. M., Youngstown, Ohio
GLADWIN, MISS MARY E., 269 South High Street, Akron, Ohio
HAGERTY, MRS. JAMES E., 94 East 15th Street, Columbus, Ohio
HAMANN, DR. C. A., 416 Osborne Building, Cleveland, Ohio
HANNA, MRS. H, M., JR., Lake Shore Boulevard, Cleveland, Ohio
HARTMANN, SAMUEL D., Tippecanoe City, Miami County, Ohio
HARVEY, P. W., 4608 Euclid Avenue, Cleveland, Ohio
HITCHCOCK, FRANK, Youngstown, Ohio
HOLMES, DR. CHRISTIAN R., 8 East Eighth Street, Cincinnati, Ohio
HOOVER, DR. C. S., Alliance, Ohio
IGLAUER, DR. SAMUEL, President, The Cincinnati Anti-Tuberculosis League, 209 West 12th Street, Cincinnati, Ohio
IRELAND, MRS. R. L., Lake Shore Boulevard, Cleveland, Ohio
JEFFREY, J. A., 581 East Town Street, Columbus, Ohio
JONES DR. CLEMENT L., Jamestown, Ohio
JOSEPH, ISAAC, 1827 East 82d Street, Cleveland, Ohio
KLOPFER, BERTRAM, President, Tuberculosis Society of Dayton, 213 West Sycamore Street, Dayton, Ohio
LAMB, DR. MORGAN B., Department of Agriculture, State House, Columbus, Ohio
LEVI, LOUIS S., Hotel Alms, Cincinnati, Ohio
LOWMAN, DR. JOHN H., 1807 Prospect Avenue, Cleveland, Ohio
LYLE, DR. B. F., Seventh and Race Streets, Cincinnati, Ohio
MCLAUCHLAN, WILLIAM, Western Reserve Building, Cleveland, Ohio

MacMullin, Miss Bessie M., 222 East Long Street, Columbus, Ohio
Markey, Dr. Edward B., 1101 North Main Street, Dayton, Ohio
Mather, S. Livingston, Cleveland, Ohio
Mather, Samuel, Western Reserve Building, Cleveland, Ohio
Mather, William G., "Gwinn," Lake Shore Boulevard, Bratenahl, Ohio
McCurdy, Mrs. Robert, 726 Wick Avenue, Youngstown, Ohio
Merriam, Dr. Walter H., 202 The Osborn, Cleveland, Ohio
Morgan, Dr. C. L., Ohio State Sanatorium, Mt. Vernon, Ohio
Moyer, Frank L., D. V. S., Carey, Ohio
Murray, William P., Western Reserve Building, Cleveland, Ohio
Norris, Hon. M. A., Youngstown, Ohio
Oglebay, Crispin, Ferro Machine and Foundry Company, Cleveland, Ohio
Paterson, Robert G., Executive Secretary, Ohio Society for the Prevention of Tuberculosis, Ohio State University, Columbus, Ohio
Pennell, Dr, William W., 205 North Main Street, Mt. Vernon, Ohio
Peskind, Dr. A., 2414 East 55th Street, Cleveland, Ohio
Pickands, Henry S., Western Reserve Building, Cleveland, Ohio
Placak, Dr. Joseph C., 820 East 95th Street, Cleveland, Ohio
Prentiss, F. F., 916 Williamson Building Cleveland, Ohio
Probst, Dr. C. O., 185 East State Street, Columbus, Ohio
Quinby, Miss May C., Terrace Road, East Cleveland, Ohio
Ravogli, Dr. A., 5 Garfield Place, Cincinnati, Ohio
Rhu, Dr. Hermann S., P. O. Box 302, Marion, Ohio
Roberts, Mrs. Edward A., 13176 Euclid Avenue, Cleveland, Ohio
Rockhill, Dr. Charles S., 22 West 7th Street, Cincinnati, Ohio
Rothenberg, Dr. Samuel, 22 West 7th Street, Cincinnati, Ohio
Rumer, Mrs. Anna H., 121 West Main Street, Chillicothe, Ohio
Sackett, Dr. W. A., Akron, Ohio
Schmidlapp, J. G., Cincinnati, Ohio
Souder, Dr. C. G., 823 Spitzer Building, Toledo, Ohio
Southward, Clara P., 135 East Main Street, Circleville, Ohio
Stambaugh, Henry H., 513 Stambaugh Building, Youngstown, Ohio
Stambaugh, John, 909 Stambaugh Building, Youngstown, Ohio
Stearns, William S., Lockland, Ohio
Strong, Mrs. Ann Gilchrist, University of Cincinnati, Cincinnati, Ohio
Tenney, Dr. C. F., Monroe Street, corner Lawrence Avenue, Toledo, Ohio
Wick, Mrs. Elizabeth G., 682 Wick Avenue, Youngstown, Ohio
Wick, Henry, 416 Wick Avenue, Youngstown, Ohio
Withrow, Samuel P., 1220 Yarmouth Avenue, Cincinnati, Ohio

OKLAHOMA

Barnard, Miss Kate, State House, Oklahoma City, Okla.
Harriss, R. T., 610 West 15th Street, Oklahoma City, Okla.
Huson, Hobart, R. F. D. No. 1, Newalla, Okla.
Mahr, Dr. J. C., Executive Secretary, Oklahoma State Anti-Tuberculosis Association, 215 Mercantile Building, Oklahoma City, Okla.
Moorman, Dr, L. J., Oklahoma City, Okla.
Paschall, Walter B., 208 Oklahoma Building, Oklahoma City, Okla.

OREGON

Bellinger, Dr. G. C., Oregon State Tuberculosis Sanatorium, Salem, Ore.
Bush, Mrs. A. N., 978 Chemeketa Street, Salem, Ore.
Coe, Dr. Urling C., Bend, Ore.
Dunbar, Mrs. Saidie Orr, Secretary, Oregon Association for the Prevention of Tuberculosis, 503 Corbett Building, Portland, Ore.
Honeymann, Mrs. Anne H., 193 King Street, Portland, Ore.
Kistner, B. H. G., care of Big Tree Lumber Camp, Knappe, Ore.
Ladd, William M., 243 West Park Street, Portland, Ore.
Mackenzie, Dr. Kenneth A., 910 Corbett Building. Portland, Ore.
Matson, Dr. Ralph C., 1021 Corbett Building, Portland, Ore.
Matson, Dr. Ray William, Portland, Ore.
Mills, A. L., First National Bank, Portland, Ore.
Pierce Dr. E. A., 811 Selling Building, Portland, Ore.
Pringle, Mrs. M. E., 535 Clifton Street, Portland, Ore.

RANDLE, DR. H. C., Nehalem, Ore.
ROARK, MISS IDA E., R. 3, Box 103, Boring, Ore.
ROSS, DR. A. H., Lebanon, Ore.
ROSS, DR. L. G., St. Helens, Ore.
SAMUEL, L., Corbett Building, Portland, Ore.
SCHORTGEN, ADAM, Salem, Ore.
STEARNS, DR. R. W., Health Officer, Medford, Ore.
WELSH, MISS GEORGIANA MARY, Good Samaritan Hospital, Portland, Ore.
WERNER, CHARLES M., 619 Worcester Building, Portland, Ore.

PENNSYLVANIA

Pennsylvania (For remainder of State see below).
ALLEN, DR. FRANCIS OLCOTT, JR., 2216 Walnut Street, Philadelphia, Pa.
ALLEN, PHILIP C., 24th and Chestnut Streets, Philadelphia, Pa.
ANDERS, DR. JAMES M., 1605 Walnut Street, Philadelphia, Pa.
BEARDSLEY, DR. E. J. G., 2030 Chestnut Street, Philadelphia, Pa.
BEIN, AUGUST, 1729 Wallace Street, Philadelphia, Pa.
BISLER, G. A., 249 North Sixth Street, Philadelphia, Pa.
BONAVENTURE, MOTHER M., Mount St. Joseph's Convent, Chestnut Hill, Philadelphia, Pa.
BRINTON, DR. WARD, 1423 Spruce Street, Philadelphia, Pa.
BROMLEY, JOSEPH H., Fourth and Lehigh Avenue, Philadelphia, Pa.
BURNHAM, GEORGE, JR., 1101 Morris Building, Philadelphia, Pa.
BURNHAM, WILLIAM, 4301 Spruce Street, Philadelphia, Pa.
CASTNER, SAMUEL, JR., 1411 Walnut Street, Philadelphia, Pa.
CLAPP, DR. GEORGE H., 5129 Baltimore Avenue, Philadelphia, Pa.
CLARK, CLARENCE M., 321 Chestnut Street, Philadelphia, Pa.
CLARK, E. W., Bullitt Building, Philadelphia, Pa.
CLARK, HERBERT L., 321 Chestnut Street, Philadelphia, Pa.
CLARKE, DR. GEORGE G., 2221 North 16th Street, Philadelphia, Pa.
COHEN, DR. A. J., 723 Pine Street, Philadelphia, Pa.
COPLIN, PROFESSOR W. M. L., Jefferson Medical College, Philadelphia, Pa.
CRAIG, DR. FRANK A., 2030 Chestnut Street, Philadelphia, Pa.
DEVEREUX, DR. ROBERT T., 2103 Hunting Park Avenue, Philadelphia, Pa.
EARLY, DR. THOMAS B., 2230 Tioga Street, Philadelphia, Pa.
EHRET, MRS. ALVIN M., 305 West Horter Street, Germantown, Philadelphia, Pa.
ELLINGER, DR. T. J., 737 North 41st Street, Philadelphia, Pa.
ELY, DR. THOMAS C., 1728 Chestnut Street, Philadelphia, Pa.
FETTERMAN, DR. WILFRED B., JR., 7047 Germantown Avenue, Philadelphia, Pa.
FLICK, DR, LAWRENCE F., 738 Pine Street, Philadelphia, Pa.
FOLTZ, DR. J. CLINTON, Summit Street, Chestnut Hill, Philadelphia, Pa.
FOULKROD, JOHN J., JR., 451 Lyceum Avenue, Roxborough, Philadelphia, Pa.
FRANCINE, DR. ALBERT PHILIP, 264 South 21st Street, Philadelphia, Pa.
FREEMAN, DR. WALTER J., 1832 Spruce Street, Philadelphia, Pa,
FUNK, DR. ELMER H., 1318 Spruce Street, Philadelphia, Pa.
FURBUSH, DR. C. LINCOLN, 1501 Spruce Street, Philadelphia, Pa.
FUSSELL, DR. M. HOWARD, 421 Lyceum Avenue, Roxborough, Philadelphia, Pa.
GERHARD, DR. GEORGE S., 58th Street and Overbrook Avenue, Philadelphia, Pa.
GERSTLEY, LOUIS, 226 South Front Street, Philadelphia, Pa.
GIBBON, DR. JOHN H., 1608 Spruce Street, Philadelphia, Pa.
GILDERSLEEVE, DR. NATHANIEL, University of Pennsylvania, Philadelphia, Pa.
GREENBAUM, DR. SIGMUND S., 1103 South 8th Street, Philadelphia, Pa.
GUCKER, F. T., 3420 Hamilton Street, Philadelphia, Pa.
GUERNSEY, DR. JOSEPH C., 1923 Chestnut Street, Philadelphia, Pa.
GWINN, MRS. JOHN, 228 South 21st Street, Philadelphia, Pa.
HACKENBURG, WILLIAM B., 1211 Arch Street, Philadelphia, Pa.
HALL, MRS. S. D., 5300 Lancaster Avenue, Philadelphia, Pa.
HAMILL, DR. SAMUEL MCCLINTOCK, 1822 Spruce Street, Philadelphia, Pa.
HATFIELD, DR. CHARLES, J. 2008 Walnut Street, Philadelphia, Pa.
HENSZEY, WILLIAM P., Baldwin Locomotive Works, Philadelphia, Pa.
HOLT, MISS CONSTANCE, 3312 Hamilton Street, Philadelphia, Pa.
HORN, FRANKLIN S., 1225 Market Street, Philadelphia, Pa.
JENKS, MRS. WILLIAM F., 920 Clinton Street, Philadelphia, Pa.
KAAS, ANDREW, 3 South 13th Street, Philadelphia, Pa.
KATZENBERG, ISAAC, 428 North Third Street, Philadelphia, Pa.

KAUFMAN, DR. ISADORE, 1115 Spruce Street, Philadelphia, Pa.
KYLE, DR. D. BRADEN, 1517 Walnut Street, Philadelphia, Pa.
LANDIS, DR. H. R. M., 11 South 21st Street, Philadelphia, Pa.
LEA, CHARLES M., 706 Sansom Street, Philadelphia, Pa.
LEA, HENRY C., 2000 Walnut Street, Philadelphia, Pa.
LECONTE, DR. ROBERT G., 1530 Locust Street, Philadelphia, Pa.
LEWIS, DR. PAUL A., Henry Phipps Institute, Philadelphia, Pa.
LIT, JACOB D., Eighth and Market Streets, Philadelphia, Pa.
LIVERIGHT, MRS. S., 910 North Broad Street, Philadelphia, Pa.
MCCRAE, DR. THOMAS, 1627 Spruce Street, Philadelphia, Pa.
MCILHENNY, JOHN D., Lincoln Drive and Johnson Street, Germantown, Philadelphia, Pa.
MALONEY, MARTIN, Land Title Building, Philadelphia, Pa.
MARKOE, MRS. JOHN, 1630 Locust Street, Philadelphia, Pa.
MARSHALL, DR. C. J., 5031 Pine Street, Philadelphia, Pa.
MITCHELL, J. KEARSLEY, 227 South 18th Street, Philadelphia, Pa.
MONTGOMERY, DR. CHARLES M., 2210 Locust Street, Philadelphia, Pa.
MONTGOMERY, MRS. T. H., 1815 DeLancey Place, Philadelphia, Pa.
MURRAY, JOSEPH E., 1420 Chestnut Street, Philadelphia, Pa.
NASH, REV. JAMES, 1121 Jackson Street, Philadelphia, Pa.
NORRIS, DR. GEORGE WILLIAM, 1530 Locust Street, Philadelphia, Pa.
PIERSOL, DR. GEORGE MORRIS, 1913 Spruce Street, Philadelphia, Pa.
RHOADS, DR. SAMUEL, 152 School Lane, Germantown, Philadelphia, Pa.
RHOADS, MRS. SARAH, 152 School Lane, Germantown, Philadelphia, Pa.
RIDGEWAY, C. S., 335 Arch Street, Philadelphia, Pa.
ROBINSON, DR. WILLIAM DUFFIELD, 2012 Mt. Vernon Street, Philadelphia, Pa.
ROECK, SISTER MARIA, Kensington Dispensary, Hancock Street and Susquehanna Avenue, Philadelphia, Pa.
ROSENHEIM, JAY B., 919 North 15th Street, Philadelphia, Pa.
ROWLAND, MRS. W. O., Frankford, Philadelphia, Pa.
SCOTT, MRS. MARY HOWARD, 1830 Rittenhouse Square, Philadelphia, Pa.
SMITH, REST FENNER, JR., Secretary, Pennsylvania Society for the Prevention of Tuberculosis, 407 Roger Williams Building, Philadelphia, Pa.
SNELLINGBURG, SAMUEL, 12th and Market Streets, Philadelphia, Pa.
SOLIS-COHEN, DR. MYER, 4102 Girard Avenue, Philadelphia, Pa.
STENGEL, DR. ALFRED, 1728 Spruce Street, Philadelphia, Pa.
STEWART, DR. F. E., H. K. Mulford Company, 426 South 13th Street, Philadelphia, Pa.
TALBOT, WALTER LEMAR, President, Fidelity Mutual Life Insurance Company of Philadelphia, Philadelphia, Pa.
THOMSON, FRANK GRAHAM, 526 Land Title Building, Philadelphia, Pa.
TOULMIN, DR. HARRY, 925 Chestnut Street, Philadelphia, Pa.
TYSON, DR. JAMES, 1506 Spruce Street, Philadelphia, Pa.
TYSON, DR. T. MELLOR, 1506 Spruce Street, Philadelphia, Pa.
VAN VALKENBURG, E. A., The North American, Philadelphia, Pa.
VOGELSON, J. A., City Hall, Philadelphia, Pa.
WALSH, DR. JOSEPH, 736 Pine Street, Philadelphia, Pa.
WANAMAKER, JOHN, City Hall Square, Philadelphia, Pa.
WANAMAKER, RODMAN, The North American, Philadelphia, Pa.
WILLCOX, JAMES M., 700 Walnut Street, Philadelphia, Pa.
WILLIAMS, ELLIS D., 560 Drexel Building, Philadelphia, Pa.
WILSON, ALEXANDER M., Assistant Director of Public Health, City Hall, Philadelphia, Pa.
WILSON, DR. H. AUGUSTUS, 1611 Spruce Street, Philadelphia, Pa.
WILSON, DR. J. C., 1509 Walnut Street, Philadelphia, Pa.
WOLF, BENJAMIN, Empire Building, 13th and Walnut Streets, Philadelphia, Pa.
WOLF, CLARENCE, Empire Building, 13th and Walnut Streets, Philadelphia, Pa.

ANDREWS, CHARLES E., JR. New Bethlehem, Pa.
ARBUTHNOT, DR. THOMAS S., 6423 Fifth Avenue, Pittsburgh, Pa.
ARMSTRONG, DR, ALEXANDER, White Haven, Pa.
BAKER, JOHN J., JR., White Haven, Pa.
BALDRIDGE, THOMAS J., Alleghany Street, Hollidaysburg, Pa.
BERRY, DR. JOHN, Mont Alto, Pa.
BONHAM, ELEANOR M., 152 East Market Street, York, Pa.
BONHAM, MISS ELIZABETH S,, 152 East Market Street, York, Pa.
BRONFENBRENNER, J., PH. D., Western Pennsylvania Hospital, Pittsburgh, Pa.

Brundred, Mrs. B. F., 315 West First Street, Oil City, Pa.
Canevin, Rt. Rev. Regis, 125 North Craig Street, Pittsburgh, Pa.
Chalfont, Mrs. Sarah W., 220 North Union Street, Kennett Square, Pa.
Cleveland, Mrs. Margaret L., 254 West 9th Street, Erie, Pa.
Deeney, William J., 535 Fulton Building, Pittsburgh, Pa.
Dimmick, J. Benjamin, Scranton, Pa.
Dixon, Dr. Samuel G., State Department of Health, Harrisburg, Pa.
Dreifus, Charles, Oliver Building, Pittsburgh, Pa.
Drexel, Mother Katherine, Convent of the Blessed Sacrament, Maud P. O., Pa.
Dull, Mrs. A. P. L., 211 North Front Street, Harrisburg, Pa.
DuPuy, Mrs. Herbert, 646 Morewood Avenue, Pittsburgh, Pa.
Dutton, Dr. Walton Forrest, 401 Fourth Avenue, Carnegie, Pa.
Eaton, Fred C., Wilburine Oil Works, Warren, Pa.
Edwards, Dr. J. F., Bureau of Health, Pittsburgh, Pa.
Ehrehart, Miss Catherine E., Selinsgrove, Pa.
Ellenberger, Dr. J. W., 922 North Third Street, Harrisburg, Pa.
Ely, Carl B., 307 North Front Street, Harrisburg, Pa.
Ely, Miss Henrietta B., Bryn Mawr, Pa.
Findley, Dr. Joseph D., 802 12th Street, Altoona, Pa.
Fisher, Dr. Henry M., Jenkintown, Pa.
Frank, Isaac W., 5601 Irwin Avenue, Pittsburgh, Pa.
Frankhauser, Dr. Fremont W., Secretary, Reading Sanatorium for the Treatment of Tuberculosis, 38 South 8th Street, Reading, Pa.
Gable, Dr. I. C., 46 South Beaver Street, York Pa.
Gensemer, George W., Pine Grove, Pa.
Germaine, Mother M., Mount St. Mary's Seminary, Scranton, Pa.
Giarth, Dr. David I., Ford City, Pa.
Gilliland, Dr. S. H., Marietta, Pa.
Green, Dr. Edgar M., 222 Spring Garden Street, Easton, Pa.
Hadley, Mrs. Alice P., Swarthmore, Pa.
Heinz, H. J., Pittsburgh, Pa.
Hitchens, Dr. A Parker, Glenolden, Pa.
Hoban, Rt. Rev. M. J., Scranton, Pa.
Holdship, C. F., 422 First Avenue, Pittsburgh, Pa.
Horner, Mrs. W. S., 1028 North Negley Avenue, Pittsburgh, Pa.
Hostetter, D. Herbert, 59 Water Street, Pittsburgh, Pa.
Houston, James W., 1235 Liberty Avenue, Pittsburgh, Pa.
Jackson, Miss Rebecca, Gulf Road, Bryn Mawr, Pa.
Jenkinson, J. M., 1155 Liberty Avenue, Pittsburgh, Pa.
Jenks, Dr. Hoarce H., 414 Midland Avenue, Wayne, Pa.
Johnson, Dr. Fred C., Mont Alto, Pa.
Johnston, A. R., New Bloomfield, Pa.
Jones Dr. Fremont C., Ebensburg, Pa,
Kalb, Dr. George B., President, Erie Branch of the Pennsylvania Society for the Prevention of Tuberculosis, Masonic Temple Erie, Pa.
Kemmerer, M. S., Mauch Chunk, Pa.
Kennedy, Dr. L. T., Pottsville, Pa.
Kerr, Mrs. William M., Trainer, Pa.
Klotz, Dr. Oskar, Pathological Laboratories, University of Pittsburgh, Pittsburgh, Pa.
Kneeland, Edward, 2303 Farmers Bank Building, Pittsburgh, Pa.
Kunkel, Dr. O. F., Bon Air Sanatorium, Bells Camp, Pa.
Laidley, Dr. J. C., Carmichaels, Pa.
Lamberton, Harry, Franklin, Pa.
Leisenring, Mrs. Annie E., 432 Chew Street, Allentown, Pa.
Levy, Rabbi J. Leonard, Hobart Street, Pittsburgh, Pa.
Litchfield, Dr. Lawrence, 5431 Fifth Avenue, Pittsburgh, Pa.
Lucas, Dr. Walter S., Wynnewood, Pa.
Luden, W. H., 709 North Fifth Street, Reading, Pa.
Luther, Dr. J. W., Palmerton, Carbon County, Pa.
McConway, William, McConway, Torley Company, Pittsburgh, Pa.
McCormick, James, P. O. Box 548, Harrisburg, Pa.
McDonald, Miss Margaret, Fern Cliff Sanatorium, White Haven, Pa.
Macfarlane, Judge James R., Woodland Road, Pittsburgh, Pa.
Mellon, R. B., 514 Smithfield Street, Pittsburgh, Pa.
Miller, Dr. J. S., York, Pa.

Miller, Dr. Robert T., Jr., 6 Colonial Place, Pittsburgh, Pa.
Miner, Dr. Charles H., 115 South Franklin Street, Wilkes-Barre, Pa.
Montgomery, A. C., 1155 Liberty Street, Pittsburgh, Pa.
Morrell, Mrs. E. DeV., Torresdale, Pa.
Mowery, Dr. J. L., Lancaster, Pa.
Munce, T. Edward, D. V. S., Post Office Box S, Harrisburg, Pa.
Neff, Dr. Joseph S., Narberth, Pa.
Orth Dr. H. L., Pennsylvania State Hospital for Insane, Harrisburg, Pa.
Pardee, Mrs. Calvin, White Marsh, Pa.
Park, James H., Box 75, Pittsburgh, Pa.
Phillips, Dr. C. R., Harrisburg, Pa.
Ramage, Samuel Y., Oil City, Pa.
Reichel, Dr. John, Glenolden Pa.
Ricketts, Col. R. B., 80 South River Street, Wilkes-Barre, Pa.
Rigg, J. E., Wilkinsburg, Pa.
Rockman, Dr. J., South Side Hospital, Pittsburgh, Pa.
Rothrock, Dr. A. M., 132 South 9th Street, Reading, Pa.
Royer, B., Frank, Ardmore, Pa.
Royer, Dr. B. Franklin, Harrisburg, Pa.
Saltsman, Mrs. R. J., 152 West 9th Street, Erie, Pa.
Satler, Charles E., 2318 Farmers Bank Building, Pittsburgh, Pa.
Schäffle Dr. Karl, State Health Department, Harrisburg, Pa.
Scheide, J. H., Titusville, Pa.
Schlesinger, Monroe J., Western Pennsylvania Hospital, Pittsburgh, Pa.
Schwartz, F. N., Box 594, Pittsburgh, Pa.
Simmons, Dr. Richard H., 116 South 6th Street, Shamokin, Pa.
Slater, Dr. S. A., Grand View Sanatorium, Oil City, Pa.
Sleeman, Mrs. A. L., Homewood Sanatorium, Warren, Pa.
Small, G. G., "Windyghoul," Beaver, Pa.
Stites, Dr. Thomas H. A., State Tuberculosis Sanatorium, Hamburg, Pa.
Stockdale, Elwell, White Haven Sanatorium, White Haven, Pa.
Strauss, S. J., Court House, Wilkes-Barre, Pa.
Taylor, M. H., 150 West 6th Street, Erie, Pa.
Thaw, Benjamin, Morewood Place, Pittsburgh, Pa.
Torrance, Francis J., Standard Sanitary Manufacturing Company, Pittsburgh, Pa.
Van Kirk, Miss A. D., 5414 Ellsworth Avenue, Pittsburgh, Pa.
Wainwright, Dr. J. M., 516 Spring Street, Scranton, Pa.
Walters, Dr. E. R., Department of Public Health, Pittsburgh, Pa.
Wetherell, Joseph 1301 Boyle Street, North Diamond Station, Pittsburgh, Pa.
Wheeler, Mrs. Rachel A. S., Endeavor, Pa.
White, Dr. William Charles, Tuberculosis League of Pittsburgh, 2851 Bedford Avenue, Pittsburgh, Pa.
Wood, Mrs. Alan, Jr., 5th Avenue and Harry Street, Conshohocken, Pa.
Woods, Dr. Edward A., Equitable Life Assurance Society, Pittsburgh, Pa.
Wright, Dr. John W., 247 West 8th Street, Erie, Pa.
Youngman, Dr. C. W., 601 Pine Street, Williamsport, Pa.

PHILIPPINE ISLANDS

de Ocampo, Dr. Gervasio, President, Colegio Medico-Farmaceutico de Filipinas, Evangelista 423, Quaipo, Manila, P. I.
Fabella, Dr. Jose, Secretary, Philippine Islands, Anti-Tuberculosis Society, Cosmopolitan Building, Manila, P. I.
Heiser, Dr. Victor G., Director of Health, Bureau of Health of the Philippine Islands, Manila, P. I.
Hutton, Major Paul C., Camp Stotsenburg, P. I.
Musgrave, Dr. W. E., Manila, P. I.

PORTO RICO

Igaravidez, Dr. P. Gutierrez, P. O. Box 1067 San Juan, P. R.

RHODE ISLAND

Akerley, Miss Mary K., 290 Thames Street, Newport, R. I.
Barnes, Dr. Harry Lee, Rhode Island State Sanatorium, Wallum Lake, R. I.

BECKWITH, MISS LORANIA C., 72 Manning Street, Providence, R. I.
BUSHNELL, MRS. GEORGE, Peace Dale R. I.
CARPENTER, MRS. F. W., 276 Angell Street, Providence, R. I.
CHANDLER, WILLIS E., Secretary, Rhode Island Anti-Tuberculosis Association, 109 Washington Street, Providence, R. I.
CHAPIN, DR. CHARLES V., City Hall, Providence, R. I.
COOKE, DR. HENRY A. 405 Angell Street, Providence, R. I.
DARRAH, DR. RUFUS E., 10 Bull Street, Newport, R. I.
EMMONS, ARTHUR B., Newport, R. I.
FULTON, DR. FRANK T., 36 Prospect Street, Providence, R. I.
GAMMELL, MRS. R. I., 327 Benefit Street, Providence, R. I.
GAMMELL, WILLIAM, P. O. Box 1436, Providence, R. I.
GREENE, SAMUEL WARD, East Greenwich, R. I.
HAMBLET, DR. MARY L., Rhode Island State Sanatorium, Wallum Lake, R. I.
HAZARD, MRS. AUGUSTA G., Peace Dale, R. I.
HAZARD, MISS CAROLINE, Peace Dale, R. I.
HAZARD, ROWLAND G., Peace Dale, R. I.
HOWLAND, MISS ALICE M., Hope, R. I.
HOWLAND, DANIEL, East Greenwich, R. I.
HOYE, DR. HENRY J., 221 Thayer Street, Providence, R. I.
METCALF, JESSE H., Providence, R. I.
METCALF, MRS. JESSE H., Woodward Road, Providence, R. I.
PACKARD, DR. MARY S., R. F. D., Centerdale, R. I.
PEABODY, DR. GEORGE L., Newport, R. I.
PENNINGTON, MISS HARRIET E., 209 Oak Hall Building, Pawtucket, R. I.
PERKINS, DR. JAY, Chairman, League for the Suppression of Tuberculosis, 125 Waterman Street, Providence, R. I.
PETTINGILL, DR. OLIN S., Wallum Lake, R. I.
PHILLIPS, FRANK N., 164 Butler Avenue, Providence, R. I.
PUTNAM, DR. HELEN C., Rhode Island Avenue, Providence, R. I.
RICHARDSON, DR. D. L., Providence City Hospital, Providence, R. I.
SIMS, MRS. WILLIAM S., 93 Rhode Island Avenue, Newport, R. I.
STOKES, JAMES BRETT, 290 Thames Street, Newport, R. I.
STONE, DR. ELLEN A., 280 Waterman Street, Providence, R. I.
SWARTS, DR. GARDNER T., State Health Officer, State House, Providence, R. I.
THORNLEY, ALBERT J., Pawtucket, R. I.
TUCKERMAN, ALFRED, 58 Kay Street, Newport, R. I.
WILLIAMS, DR. PEARL, 129 Broad Street, Providence, R. I.

SALVADOR

LAZO-ARRIAGO, DR. LUIS, San Salvador, Republic of Salvador.

SOUTH CAROLINA

ALLAN, DR. SARAH C., President, Charleston Society for the Study and Prevention of Tuberculosis, 222 Rutledge Avenue, Charleston, S. C.
CORBETT, DR. JOHN W., Camden, S. C.
DAWSON, DR. JOHN L., 82 Tradd Street, Charleston, S. C.
GADSDEN, P. H., 141 Meeting Street, Charleston, S. C.
SMITH, PROF. REED, 1628 Pendleton Street, Columbia, S. C.
TABER, MRS. STEPHEN, 1011 Henderson Street, Columbia, S. C.
WILLIAMS, DR. C. F., 1230 Sumter Street, Columbia, S. C.
WILSON, DR. ROBERT, JR., 165 Rutledge Aveune, Charleston, S. C.

SOUTH DAKOTA

SPAFFORD, DR. FREDERICK A., Flandreau, S. D.
WANZER, MRS. EDWIN P., Armour, S. D.
WOODWORTH, DR. R. E., South Dakota Sanatorium, Custer, S. D.

SWITZERLAND

KLEBS, DR. ARNOLD C., Les Terrasses, Nyon, Switzerland.

SYRIA

EDDY, DR. MARY P., Mt, Lebanon Sanatorium, Beirut, Syria.

TENNESSEE

BERRY, L. L., 214 Sixth Avenue, South, Nashville, Tenn.
HAGGARD, DR. W. D., 148 Eighth Avenue, N., Nashville, Tenn.
JACOB, DR. M., University of Tennessee, Agricultural Experiment Station, Knoxville, Tenn.
LITTERER, DR. WILLIAM, Nashville, Tenn.
PATTEN, J. A., Chattanooga, Tenn.
PATTEN, Z. C., JR., Chattanooga, Tenn.
PLEWES, MISS N. E., Pine Breeze Sanatorium, Chattanooga, Tenn.
PRESTON, T. R., care of Hamilton National Bank, Chattanooga, Tenn.
SCHEIBLER, JULIUS W., 271 Court Street, Memphis, Tenn.
SEAY, DR. JOHN L., Whitewell, Tenn.
SNOWDEN, MRS. R. BRINKLEY, 1397 Central Avenue, Memphis, Tenn.
STAGMAIER, JOHN, Care of Stagmaier Company, Chattanooga, Tenn.

TEXAS

ARMS, DR. B. L., University of Texas, Galveston, Tex.
BIRD, GEORGE J., San Angelo, Tex.
BRACKENRIDGE, HON. GEORGE W., San Antonio, Tex.
COLQUITT, MRS. O. B., President, Texas Anti-Tuberculosis Association, 4950 Live Oak Street, Dallas, Tex.
CORNICK DR. BOYD, San Angelo, Tex.
DAVIS, DR. JOHN L., Amicable Life Insurance Company, Waco, Tex.
DUDGEON, DR. L. O., Sweetwater, Tex.
FARMER, DR. W. C., 713 Gibbs Building, San Antonio, Tex.
HENDRICKS, DR. C. M., Masonic Temple, El Paso, Tex.
HOLLOWAY, DR. JAMES H., Hendrick Sanatorium, El Paso, Tex.
HOMAN, DR. R. B., The Homan Santorium, El Paso, Tex.
JONES, DR. G. LEONARD, Box 267, San Angelo, Tex.
JONES, IRA P., JR., Secretary Houston Anti-Tuberculosis League, Inc., 310 Paul Building, Houston, Tex.
LANKFORD, DR. JOHN S., San Antonio, Tex,
LOVING, DR. R. S., 102 West Jefferson Avenue. Dallas, Texas
MCKNIGHT, DR. JOSEPH B., Texas State Sanatorium for Tuberculosis, Carlsbad, Tex.
MCSWAIN, R. B., San Angelo, Tex.
NEWTON, ROBERT J., 1830 River Avenue, San Antonio, Tex.
PASCHAL DR. F., San Antonio, Tex.
PERKINS, MISS MARGARETTA, Carlsbad, Tex.
PRENTISS, DR. ELLIOTT C., 515 Roberts-Banner Building, El Paso, Tex.
SAUVIGNET, DR. E. H., Laredo, Tex.
SHARP, MRS. W. B., Houston, Tex.
SWENSON, J. R., 50 North Normal Street, Denton, Tex.
THOMAS, DR. G. T., Carson Building, Amarillo, Tex.
THOMPSON, DR. SAM E., Carlsbad, Tex.
WASHER, NAT M., San Antonio, Tex.

UTAH

BEATTY, DR. T. B., Utah State Board of Health, 39 Mercantile Block, Salt Lake City, Utah.
BEEBE, O. C., care of Zion's Savings Bank and Trust Company, Salt Lake City, Utah.
BROWNING, M. S., 2700 Washington Avenue, Ogden, Utah.
GRANT, HEBER J., Home Fire Insurance Company of Utah, 22 South Main Street, Salt Lake City, Utah.

VERMONT

BRADLEY, R. M., East Dammerston, Vt.
CAVERLY, DR. CHARLES S., President, State Board of Health, Rutland, Vt.
CLANCY, MISS ALICE B., Windsor, Vt.
GOODALL, DR. HENRY S., 532 Main Street, Bennington, Vt.
HOLTON, DR. HENRY D., Brattleboro, Vt.

LADD, DR. H. A., State Board of Health, Burlington, Vt.
PARTRIDGE, F. C., Proctor, Vt.
PROCTOR, MISS E. D., Proctor, Vt.
PROCTOR, REDFIELD, Vermont Marble Company, Proctor, Vt.
ROGERS, DR. EDWARD J., Vermont Sanatorium, Pittsford, Vt.
TUCKER, DR. HENRY, Brattleboro, Vt.

VIRGINIA

BOSHER, DR. ROBERT S., JR., 11 North First Street, Richmond, Va.
BROWN DR. G. W., Eastern State Hospital, Williamsburg, Va.
EWALD, MISS MARY E., Catawba Sanatorium, Va.
GRANDY, DR. CHARLES R., 416 Bank of Commerce Building, Norfolk, Va.
HASSINGER, L. C., Konnarock, Va.
HEDGES, DR. H. S., Charlottesville, Va.
HENSON, DR. B. C., Mountain View Sanatorium, Catawba, Va.
JOHNSTON, DR. GEORGE BEN, 405 East Grace Street, Richmond, Va.
LLOYD, DR. JOHN J., Catawba Sanatorium, Catawba, Va.
MARSHALL, DR. HARRY T., University P. O., Va.
MUNFORD, MRS. B. B., 503 East Grace Street, Richmond, Va.
SCHMELZ, MRS. HENRY L., Hampton, Va.
SPILMAN, MRS. ANNIE, Elway Hall, Warrenton, Va.
STRUDWICK, EDMUND, P. O. Box 818, Richmond, Va.
TALIAFERRO, DR. B. L., Catawba Sanatorium, Roanoke County, Va.
WATSON, DR. EVERETT E., Mt. Regis Sanatorium, Salem, Va.
WELLS, MISS M. E., Catawba Sanatorium, Roanoke County, Va.
WHITTAKER, W. H., Occoquan, Va,
WILLIAMS, DR. ENNION G., 1110 Capitol Street, Richmond, Va.

WASHINGTON

BAGLEY, MRS. A. W., 1504 North Fife Street, Tacoma, Wash.
BAILEY, MRS. GEORGE H., 5003 9th Avenue, Northeast, Seattle, Wash.
BEARD, E. E., Vancouver, Wash.
BENTLEY, DR. FREDERICK, 404 Cobb Building, Seattle Wash.
CARY, DR. RAYMOND J., Mountain View Sanatorium, Lake View, Wash.
COOK, DR. A. L., Bellingham, Wash.
COX, DR. W. C., Everett, Wash.
DURYEE DR. A. P., American National Bank Building, Everett, Wash.
EARLE, DR. BAYLIS, Port Townsend Quarantine Station, Port Townsend, Wash.
ELFORD, A. E., 1057 Summit Avenue, Seattle, Wash.
ELLIS, MRS. O. G., 1609 Water Street, Olympia, Wash.
GRISWOLD, DR. W. S., Cobb Building, Seattle, Wash.
HEG, DR. ELMER E., 719 Cobb Building, Seattle, Wash.
HURLEY, DR. GEORGE I., Hoquiam, Wash.
JOHNSTON, DR. WILSON, Spokane, Wash.
JONES, MRS. TABITHA, Womens Reading Club, Walla Walla, Wash,
KANE, MRS. J. S., Secretary, Ladies Montefiore Aid Society, 348 16th Street, Seattle, Wash.
LEE, MRS. GEORGE W., Omak, Wash.
LLOYD, DR. BOLIVAR J., United States Public Health Service, 235 Central Building, Seattle, Wash.
LYNCH, DR. C. J., North Yakima Wash.
MCCONNELL, W. M., Secretary, Western Union Life Insurance Co., Spokane, Wash.
MALLETTE, MRS. C. E., 444 East 10th Avenue, Spokane, Wash.
MANNING, DR. JOHN B., 604 Cobb Building, Seattle, Wash.
MANNING, WILLIAM WAYLAND, care of Manning and Company, 1519 Pike Place, Seattle, Wash.
PASCHALL, DR. BENJAMIN S., 664 Empire Building, Seattle, Wash.
QUEVLI, DR. CHRISTEN, Tacoma, Wash.
QUEVLI, MRS. MARIE FOSS, 715 North J Street, Tacoma, Wash.
SHERLOCK, A. J., Pulmonary Hospital of Seattle, Seattle, Wash.
SLYFIELD, DR. FREDERICK, Pulmonary Hospital of Seattle, Seattle, Wash.
SMITH, J. V. A., Chairman, Red Cross Seal Committee of Seattle and King County, Seattle, Wash.

Stith, Dr. Robert M., Chief of Tuberculosis Division, Seattle Department of Health and Sanitation, 415 City Hall, Seattle, Wash.
Sutherland, Dr. James, 604 Old National Bank Building, Spokane, Wash.
Suttner, Dr. C. N., Walla Walla, Wash.
Turner, Dr. Paul A., 805 American Bank Building, Seattle, Wash.
Tuttle, Dr. T. D., Secretary State Board of Health, Seattle, Wash.
Weeks, Mrs. R. F., Secretary, Woman's Century Club, 1704 12th Avenue, Seattle, Wash.
Weinzirl, Prof. John, Secretary, Washington Association for the Prevention and Relief of Tuberculosis, 916 Cobb Building, Seattle, Wash.
Wickersham, Miss Nan, Olympic View Hotel, Seattle, Wash.

WEST VIRGINIA

Beury, Mrs. Julia, Beury, W. Va.
Campbell, C. W., 1102 Fifth Avenue, Huntington, W. Va.
Clovis, Dr. E. E., Terra Alta, W. Va.
Cummings, Dr. Edward, Hinton Hospital Hinton, W. Va.
Dye, Dr. W. T. W., Grantsville, W. Va.
Ensign, John W., 1320 Third Avenue, Huntington, W. Va.
Garner, James A., C. &. O. Restaurant, Huntington, W. Va.
Hinzman, Dr. Woodford, Terra Alta, W. Va.
Jackson, Mrs. Malcolm, 30 Bradford Street, Charleston Kanawha, W. Va.
McCune-Rossa, Dr. M. Virginia, Eastern Pan Handle Association for the Study and Prevention of Tuberculosis, Martinsburg, W. Va.
Rathbone, Mrs. Mary E., 704 Ann Street, Parkersburg, W. Va.
Smith, Harrison B., President, Southern States Mutual Life Insurance Company, Charleston, W. Va.
Spurr, Rev. B. M., Moundsville, W. Va.
Tompkins, Dr. W. W., 122½ Capitol Street, Charleston, W. Va.
Wilson, Blair P., Huntington, W. Va.

WISCONSIN

Allis, Louis, 133 Stewart Street, Milwaukee, Wis.
Bellis, Dr. G. L., Wanwatosa, Wis.
Bossert, G. Fred, 719 Franklin Place, Milwaukee, Wis.
Bossert, Miss J. Charlotte, 719 Franklin Place, Milwaukee, Wis.
Bradford, Mrs. Mary D., 426 Park Avenue, Kenosha, Wis.
Connor, Craig P., Auburndale, Wis.
Dearholt, Dr. H. E., Executive Secretary The Wisconsin Anti-Tuberculosis Association, 471 Van Buren Street, Milwaukee, Wis.
Ells, Mrs. Frederick W., 889 Summit Avenue Milwaukee, Wis.
Ernst, Dr. George R., Division of Tuberculosis, Department of Health, Milwaukee, Wis.
Evans, Dr. Edward, 121 South 13th Street, LaCrosse, Wis.
Fabian, Arthur E. H., M. D. C., Lake Geneva, Wis.
Harlow, Dr. George A., Northwestern Mutual Life Insurance Company, Milwaukee, Wis.
Hay, Dr. Thomas H., Stevens Point, Wis.
Hays, Charles D., 351 East Water Street, Milwaukee, Wis.
Hosmer, Dr. M. S., 215 Knight Block, Ashland, Wis.
Johnson, Dr. Fred, Eau Claire, Wis.
Kirkpatrick, John, Richland Center, Wis.
Kradwell, Dr. William T., The Milwaukee Sanatorium, Wauwatosa, Wis.
May, Francis E., Lake Geneva, Wis.
Mayer, George P., Mayer Boot and Shoe Company, Milwaukee, Wis.
Norris, Mrs. C. W., 1906 Grand Avenue, Milwaukee, Wis.
Pabst, Gustave, 917 Chestnut Street, Milwaukee, Wis.
Pfister, Charles F., 1210 1st National Bank Building Milwaukee, Wis.
Sawyer, Edgar P., Oshkosh, Wis.
Schneider, Dr. Joseph, 311 Knapp Street, Milwaukee, Wis.
Schuette, August, 1131 South 8th Street, Manitowoc, Wis.
Sidenburg, Paul, 351 East Water Street, Milwaukee, Wis.
Stern, Walter, 525 Astor Street, Milwaukee, Wis.
Thanhauser, Frank, 399 Summit Avenue, Milwaukee, Wis.
Upmeyer, William H., Mark Block, Milwaukee, Wis.

VOJE, DR. J. H., Waldheim Park, Oconomowoc, Wis.
WALBRIDGE, DR. F. E., River Pines, Stevens Point, Wis.
WALKLEY, SEYMOUR J., M. D. V., 185 Northwestern Avenue, Milwaukee, Wis.
WARFIELD, DR. LOUIS M., Milwaukee County Hospital, Wauwatosa, Wis.
WASHBURN, DR. WILLIAM H., 1242 Wells Building, Milwaukee Wis.
WILLETT, DR. THOMAS, 625 72d Street, West Allis, Wis.

WYOMING

WYMAN, DR. W. A., Secretary, State Board of Health, Cheyenne, Wyo.

INDEX

INDEX

Address of the President, 17
Advisory Council, 37
Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, by Theodore B. Sachs, 150
Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, by C. H. Vrooman, 159

Bacteraemic Nature of Leprosy and Tuberculosis, D. Rivas, 233
Beals, Bethesda I., Discussion on Duties and Opportunities of the State Association, 309
Discussion on The Official Responsibility of the County in the Tuberculosis Problem, 292
Bisaillon, Marr, and Ralph C. Matson, The Influence of Lung Disease Through Artificial Diaphragm Paralysis, 183
Brewer, Charlotte Underhill, Discussion in Duties and Opportunities of the Local Association, 318
Brewer, Isaac W., House Infection—A Potent Source of Tuberculosis, 328
Discussion on Does the General Practitioner Utilize the Means at his Disposal for the Diagnosis of Early Pulmonary Tuberculosis, 114
Discussion on Official Responsibility of the State and its Sub-Divisions in the Tuberculosis Problem, 299
Bronfenbrenner, J., and M. J. Schlesinger, On New Methods of Serum Diagnosis of Tuberculosis, 242
Browning, Charles C., Discussion on The Child and the Home, 45
Discussion on Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 106
Discussion on Cutaneous Tuberculin Vaccination Method, 86
Discussion on Duties and Opportunities of the State Association, 308

Care of Spontaneous Pyopneumothorax Complicated by Hydro- or Pyopneumopericardium, by Alfred Meyer, 193
Chesley, A. J., and E. M. Wade, The Widal Reaction in Tuberculosis Persons, 250
Child and the Community, by Edward O. Otis, 56
Child and the Home, by George M. Kober, 41
Child and the School, by Sherman C. Kingsley, 48
Cipes, J. S., Discussion on Non-Tuberculous Lesions of the Lung, 144
Clinical Observations on Artificial Pneumothorax with Report of 73 Cases, by Ralph C. Matson, 175
Clinical Report on 69 Cases Treated by Artificial Pneumothorax, by Herman Schwatt, 164
Clinical Section, 67
Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, by John B. Manning and Howard James Knott, 101
Communicability of the Avian Tubercule Bacterium to Mammals, by L. R. Himmelberger, 262
Constitution and By-Laws, 353
Cutaneous Tuberculin Vaccination Method, by John Ritter, 72

Davis, David John, Some Observations in Streptothrix Infections and their Relation to Tuberculosis, 255
Davis, Michael M., Jr., Discussion on House Infection, 333
Discussion on Official Responsibility of the State and its Sub-Divisions in the Tuberculosis Problem, 299
DeForest, Charles M., Discussion on The Official Responsibility of the County in the Tuberculosis Problem, 295
DeWitt, Lydia M., The Value of Copper in the Treatment of Tuberculosis, 237
Discussion on Non-Tuberculous Lesions of the Lung, 145
Diagnosis on Intra-Thoracic Tuberculosis in Children, by W. J. Dobbie, 93
Dobbie, W. J., The Diagnosis of Intra-Thoracic Tuberculosis in Children, 93
Does the General Practitioner Utilize the Means at his Disposal for the Diagnosis of Early Pulmonary Tuberculosis? by James S. Ford, 108
Duties and Opportunities of the Local Tuberculosis Association, by James Minnick, 312

Duties and Opportunities of the State Association, by Miss E. L. M. Tate, 302
Dworetsky, Julius, Prevention and Care of Laryngeal Tuberculosis, 119

Easton, Ernest D., Discussion on The Official Responsibility of the City in the Tuberculosis Problem, 283
Essential Points in the Early Determination of Tubercule, by Frederick Slyfield, 132
Executive Office Report, 27
Exudates in Artficial Pneumothorax, by LeRoy S. Peters, 186

Forster, Alexius M., Gerald B. Webb, and G. Burton Gilbert, Trachea Position, 69
Ford, James S., Does the General Practitioner Utilize the Means at His Disposal for the Diagnosis of Early Pulmonary Tuberculosis, 108
Frankel, Lee K., Discussion on The Official Responsibility of the State in the Tuberculosis Problem, 273
Functions of the Spleen in the Experimental Infection of Albino Mice with Bacillus Tuberculosis, 228
Further Observations on the Presence of Iodine in Tuberculosis Tissues, by Paul A. Lewis and Robert B. Kranz, 231

Geographical List of Members, 351
Gilbert, G. Burton, and Gerald B. Webb, Immunity in Tuberculosis, 227
Gilbert, G. Burton, and Gerald B. Webb and Alexander M. Forster, Trachea Position, 69
Gray, Ethan A., and Olga Pickmann, "Pancreatic Ferment Determination in Pulmonary Tuberculosis, 126
Discussion on Artificial Pneumothorax, 203
Discussion on Cutaneous Tuberculin Vaccination Method, 87
Discussion on Non-Tuberculous Lesions of the Lung, 144
Discussion on Trachea Position, 71
Griggs, Joseph F., Discussion on Non-Tuberculous Lesions of the Lung, 145

Hastings, Charles J., Relative Prevalence of Tuberculosis under Good and Bad Housing Conditions, 335
Hatfield, Charles J., The Relation State and Local Anti-Tuberculosis Associations should Sustain to Each Other, 321
Hay, Thomas H., Discussion on Cutaneous Tuberculin Vaccination Method, 87
Himmelberger, L. R., Communicability of the Avian Tubercule Bacterium to Mammals, 262
Housing and Tuberculosis, by Lawrence Veiller, 343
House Infection—A Potent Source of Tuberculosis, by Isaac W. Brewer, 328

Immunity in Tuberculosis, by G. Burton Gilbert and Gerald B. Webb, 227
Influence of Lung Disease Through Artificial Diaphragm Paralysis, by Ralph C. Matson and Marr Bisaillon, 183

Jacobs, Philip P., Discussion on Relation State and Local Anti-Tuberculosis Associations Should Sustain to Each Other, 327

Keilty, Robert A., A Study of the Cultivation of the Tubercule Bacillus Directly from the Sputum, 248
Kingsley, Sherman C., The Child and the School, 48
Discussion on Duties and Opportunities of the Local Association, 319
Discussion on Housing and Tuberculosis, 347
Klotz, Walter C., A Study of Kroenig's Isthmus in Pulmonary Tuberculosis, 88
Discussion on Prevention and Cure of Laryngeal Tuberculosis, 125
Knott, Howard James, and John B. Manning, A Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 101
Kober, George M., Address of the President, Tuberculosis with Special Reference to its Prevention, 17
Child and the Home, 41
Discussion on House Infection, 331
Kraus, Robert B., and Paul A. Lewis, Further Observations on the Presence of Iodine in Tuberculosis Tissues, 231

Lewis, Paul A., and Arthur Georges Margot, The Function of the Spleen in the Experimental Infection of Albino Mice with Bacillus Tuberculosis
and Robert B. Kraus, Further Observations on the Presence of Iodine in Tuberculosis Tissues, 231
Lyman, David R., Sanatorium Temperature Records, 205

McCredie, Mrs. R. C., Discussion on Official Responsibility of the State and its Sub-Divisions in the Tuberculosis Problem, 299
McMichael, O. W., Discussion on Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 106
Discussion on Cutaneous Tuberculin Vaccination Method, 86
Mannheimer, George, Discussion on Artificial Pneumothorax, 203
Discussion on Cutaneous Tuberculin Vaccination Method, 86
Discussion on Non-Tuberculous Lesions of the Lung, 144 and 145
Duscussion on Pancreatic Ferment Determination in Pneumothorax, 130
Discussion on Trachea Positions, 71
Manning, John B., and Howard James Knott, Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 101
Margot, Arthur Georges and Paul A. Lewis, The Function of the Spleen in the Experimental Infection of Albino Mice with Bacillus Tuberculosis, 228
Matson, Ralph C., Clinical Observations on Artificial Pneumothorax with Report of 73 Cases, 175
and Marr Bisaillon, The Influence of Lung Disease Through Artificial Diaphragm Paralysis, 183
Matson, Ray W., The X-Ray an Aid in the Study of Pulmonary Tuberculosis, 116
Meyer, Alfred, A Case of Spontaneous Pyopneumothorax Complicated by Hydro or Pyopneumopericardium, 193
Discussion on Non-Tuberculous Lesions of the Lung, 145
Discussion on Artificial Pneumothorax, 202
Discussion on Pancreatic Ferment Determination in Pulmonary Tuberculosis, 130
Minnick, James, Duties and Opportunities of the Local Tuberculosis Associations, 312

Nelbach, George J., The Official Responsibility of the County in the Tuberculosis Problem, 288
Non-Tuberculous Lesions of the Lung, by William Charles White, 140

Official Responsibility of the City in the Tuberculosis Problem, by Theodore B. Sachs, 278
Official Responsibility of the County in the Tuberculosis Problem, by George J. Nelbach, 288
Official Responsibility of the State in the Tuberculosis Problem, by William Charles White, 269
Otis, Edward O., The Child and the Community, 56
Discussion on Artificial Pneumothorax, 199
Discussion on Essential Points in the Early Determination of Tubercule, 138
Discussion on Non-Tuberculous Lesions of the Lung, 144

Pancreatic Ferment Determination in Pulmonary Tuberculosis, by Ethan A. Gray and Olga Pickmann, 126
Pathological Section, 209
Peters, LeRoy S., Exudates in Artificial Pneumothorax, 186
Discussion on The Duties and Opportunities of the State Association, 307
Pickmann, Olga, and Ethan A. Gray, Pancreatic Ferment Determination in Pulmonary Tuberculosis, 126
Pierce, E. A., Discussion on A Study of Kroenig's Isthmus in Pulmonary Tuberculosis, 92
President's Address, 17
Preston, Josephine Corliss, Discussion on The Child and the School, 54
Prevention and Care of Laryngeal Tuberculosis, by Julius Dworetsky, 119

Quevli, Christen, Introductory Remarks to Advisory Council, 39
Discussion on Non-Tuberculous Lesions of the Lung, 145
Quevli, Mrs. Christen, Discussion on Duties and Opportunities of the State Association, 309

Report of the Executive Office, 27
Report of Meeting, 11
Report of the Treasurer, 14
Relation State and Local Anti-Tuberculosis Associations Should Sustain to Each Other, by Charles J. Hatfield, 321
Relative Prevalence of Tuberculosis under Good and Bad Housing Conditions, by Charles J. Hatfield, 335
Ritter, John, Cutaneous Tuberculin Vaccination Method, 73
Discussion on Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 106
Discussion on Essential Points in the Early Determination of Tubercule, 139

Discussion on Pancreatic Ferment Determination in Pulmonary Tuberculosis, 131
Discussion on a Study of Kroenig's Isthmus in Pulmonary Tuberculosis, 92
Rivas, D., The Bacteraemic Nature of Leprosy and Tuberculosis, 233
Royce, C. E., Tuberculosis of the Ovary, 263.
Royer, B. Franklin, Discussion on Official Responsibility of the State and its Sub-Divisions in the Tuberculosis Problem, 298
Discussion on Relative Prevalence of Tuberculosis under Good and Bad Housing Conditions, 339
Sachs, Theodore B., Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, 150
The Official Responsibility of the City in the Tuberculosis Problem, 278
Sala, E. M., Discussion on Essential Points in the Early Determination of Tubercle, 139
Sanatorium Temperature Records, by David R. Lyman, 205
Schlesinger, M. J., and J. Bronfenbrenner, On New Methods of Serum Diagnosis of Tuberculosis, 242
Schwatt, Herman, A Clinical Report on 69 Cases Treated by Artificial Pneumothorax, 164
Serum Diagnosis of Tuberculosis in Relation to Immunization and Prophylaxis by Enrico Castelli, 211
Shiels, B. F., Discussion on Official Responsibility of the State and its Civil Sub-Divisions in the Tuberculosis Problem, 300
Shortle, A. G., The Treatment of Pulmonary Hemorrhage by Venesection, 147
Slyfield, Frederick, Essential Points in the Early Determination of Tubercle, 132
Sociological Section, 267
Some Observations on Streptothrix Infections and their Relation to Tuberculosis, by David John Davis, 255
Stewart, David A., Discussion on Essential Points in the Early Determination of Tubercle, 138
Stith, Robert M., Discussion on Duties and Opportunities of the Local Association, 318
Stone, Seymour H., Discussion on Relation State and Local Anti-Tuberculosis Associations Should Sustain to Each Other, 326
Strawson, Arthur J., Discussion on The Duties and Opportunities of the State Association, 306
Study of the Cultivation of the Tubercle Bacillus Directly from the Sputum, by Robert M. Keilty, 248
Study of Kroenig's Isthmus in Pulmonary Tuberculosis, by Walter C. Klotz, 88

Tate, Miss E. L. M., The Duties and Opportunities of the State Association, 302
Trachea Position, by Gerald B. Webb, Alexius M. Forster, and G. Burton Gilbert, 69
Treasurer's Report, 14
Treatment of Pulmonary Hemorrhage by Venesection, by A. G. Shortle, 147
Tuberculosis of the Ovary, by C. E. Royce, 263
Tuttle, Thomas D., Discussion on The Child and the Community, 64

Value of Copper in the Treatment of Tuberculosis, Lydia M. DeWitt, 237
Van Syckle, Miss Maude, Discussion of The Official Responsibility of the State in the Tuberculosis Problem, 297
Vrooman, C. H., Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, 159
Discussion on Artificial Pneumothorax, 204

Wade, E. M., and A. J. Chesley, The Widal Reaction in Tuberculosis Persons, 250
Webb, Gerald B., and G. Burton Gilbert, Immunity and Tuberculosis, 227
and Alexius M. Forster and G. Burton Gilbert, Trachea Position, 69
Discussion on Clinical Study of 228 Children in Relation to Tuberculosis Exposure Controlled by Von Pirquet Reaction, 107
Discussion on Essential Points in the Early Determination of Tubercle, 138
White, William Charles, Non-Tuberculous Lesions of the Lung, 140
The Official Responsibility of the State in the Tuberculosis Problem, 269
Discussion on Does the General Practitioner Utilize the means at his Disposal for the Diagnosis of Early Pulmonary Tuberculosis, 115
Discussion on Essential Points in the Early Determination of Tubercle, 137

Discussion on Official Responsibility of the State and its Civil Sub-Divisions in the Tuberculosis Problem, 300
Discussion on The X-Ray as an Aid in the Study of Pulmonary Tuberculosis, 117
Widal Reaction in Tuberculosis Persons, by A. J. Chesley and E. M. Wade, 250
X-Ray as an Aid in the Study of Pulmonary Tuberculosis, by Ray W. Matson, 116